ABSTRACT

Title of Document: THE SOCIAL BEHAVIORS AND EMOTIONAL CHARACTERISTICS OF INDIVIDUALS ELEVATED ON SOCIAL ANHEDONIA

Katiah Llerena, Master of Science, 2010

Directed By: Professor Jack J. Blanchard, Ph.D., Department of Psychology

Research suggests that social anhedonia (SocAnh) is a promising indicator for the vulnerability towards developing schizophrenia-spectrum disorders as well as an important determinant of the social impairment associated within these disorders. In this study we sought to examine the hypothesis that, within social affiliative interactions, individuals with SocAnh demonstrate problematic behavioral skills and experiential deficits. The current study compared controls (n=54) to individuals elevated on SocAnh (n=42) within a videotaped social interaction focusing on an initial affiliative interaction. Compared to controls, participants with SocAnh were rated as less behaviorally affiliative and they were rated as having overall lower social skills. There were no group differences on ratings of facial affect. SocAnh participants reported experiencing less positive affect in response to the social interaction, were less willing to engage in future social interactions with their interaction partner, and had less affiliative reactions toward the interaction partner.

Results converge with prior findings in that individuals with SocAnh may experience less positive and affiliative reactions in response to social interactions. They may also be less apt in interacting with social partners in affiliative ways. Notably, results of the current study also demonstrate that the simulated live social interaction developed for the current study may better elicit social affiliative behaviors and experiences than previous stimuli.

THE SOCIAL BEHAVIORS AND EMOTIONAL CHARACTERISTICS OF INDIVIDUALS ELEVATED ON SOCIAL ANHEDONIA

By

Katiah Llerena

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Advisory Committee:
Professor Jack J. Blanchard, Chair
Assistant Professor Andres De Los Reyes
Research Assistant Professor Shannon M. Couture

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CHAPTER 1: INTRODUCTION

SCHIZOPHRENIA AND SOCIAL FUNCTIONING

Schizophrenia is a chronic, severe, and disabling disease that affects about 0.5 to 1 percent of the population in a given year (Messias, Chen, & Eaton, 2007; National Institute of Mental Health [NIMH], 2009). Social functioning deficits are one of the most debilitating aspects of schizophrenia. Poor social functioning in schizophrenia includes poor social interactions, difficulty in maintaining relationships with family and friends, and difficulty maintaining employment (Bryson & Bell, 2003; Green, Kern, Braff, & Mintz, 2000; Kasckow et al., 2001; Lehman, Ward, & Ninn, 1982; Mathews & Barch, 2010). Impaired social functioning also impacts quality of life (Penn, Corrigan, Bentall, Racenstein, & Newman, 1997) and predicts poor outcome in schizophrenia including relapse, poor illness course, and unemployment (Perlick, Stastny, Mattis, & Teresi, 1992; Sullivan, Marder, Liberman, Donahoe, & Mintz, 1990; Tien & Eaton, 1992). Furthermore, social functioning is an important predictor of recovery (Novick, Haro, Suarez, Naber, & Vieta, 2009).

Social functioning deficits are seen prior to illness onset (Baum & Walker, 1995; Walker, 1994, Tarbox & Pogue-Geile, 2008) and throughout the course of schizophrenia. The onset of illness in late adolescence or early adulthood may lead to withdrawal from social environments that can be detrimental to key social relationships (Neumann & Walker, 1998; Randolph, 1998). As a result, adolescents with schizophrenia often have trouble developing successful peer relationships and may become socially isolated (Neumann & Walker, 1998). This carries into adulthood as persons with schizophrenia fail to develop typical social networks and

supports (Howard, Leese, and Thornicroft, 2000). Studies have found that poor social adjustment at the onset of schizophrenia is a strong predictor of more adverse long-term outcomes (Hafner, Loffler, Maurer, Hambrecht, & Heiden, 1999; Paillere-Martinot, Aubin, Martinot, and Colin, 2000). Furthermore, Grant et al. (2001) found general social functioning impairments in first episode psychosis, which were comparable in magnitude to those of more chronically ill individuals. This indicates that social dysfunction has implications for the development and course of schizophrenia.

Given the harmful consequences of social functioning deficits in schizophrenia, researchers have attempted to identify factors that may underlie social dysfunction. One such factor is the diminished capacity to experience pleasure derived from social interactions and relationships (Kwapil, 1998; Kwapil, Barrantes-Vidal, & Silvia, 2008; Meehl, 1962). This tendency to derive little or no pleasure from social interactions is referred to as social anhedonia. Specifically, social anhedonia involves a lack of pleasure from being with others, lack of pleasure in talking to others, and reduced feelings of liking/loving others (Chapman, Chapman, Raulin, 1978). Social anhedonia is elevated in individuals with schizophrenia (Berenbaum & Oltmanns, 1992; Blanchard, Mueser, & Bellack, 1998; Harvey, Bodnar, Sergerie, Armony, & Lepage, 2009; Katsanis, Iacono, & Beiser, 1990), and it appears to be an enduring individual difference in schizophrenia (Blanchard et al., 1998; Blanchard, Horan, & Brown, 2001). Furthermore, social anhedonia is elevated in family members of individuals with schizophrenia (Katsanis, et al., 1990; Kendler, Thacker, & Walsh, 1996), thus indicating a possible genetic component to this trait.

In addition to its important role in schizophrenia, social anhedonia has also received interest in non-clinical individuals. Specifically, social anhedonia can be assessed within individuals displaying features of schizotypy, as well as a trait factor in healthy populations. The following sections will review the current research and clinical importance of social anhedonia in schizophrenia and schizotypy, as well as in the general population. This will be followed by a review of the social deficits observed in social anhedonia, and will end with a discussion of the possible role of emotional deficits in the development and maintenance of social dysfunction in individuals elevated on social anhedonia.

HISTORY AND PREDICTIVE VALIDITY OF SOCIAL ANHEDONIA

Historical Background of Social Anhedonia

Classic descriptions of schizophrenia include emotional abnormalities and place particular emphasis on anhedonia (Bleuler, 1950; Kraepelin, 1919). Based on work by Rado (1962), Meehl (1962) hypothesized that anhedonia was a key component of schizotypy. Meehl's concept of schizotaxia is a genetically based neural defect that is the pathophysiology of schizophrenia. According to Meehl's theory, individuals with schizotaxia will develop schizotypy, which is the behavioral manifestation of the latent vulnerability for developing schizophrenia. Meehl (1962) postulated that the base rate of individuals having schizotypy in the general population is approximately 10%. Not all individuals with schizotypy will decompensate into schizophrenia. Four core features including anhedonia, ambivalence, cognitive slippage, and interpersonal aversiveness characterize Meehl's schizotype. Of these core features, recent literature suggests that social anhedonia

may be a promising indicator for the vulnerability towards developing schizophrenia-spectrum disorders (Chapman, Chapman, Kwapil, Eckbald, & Zinser, 1994; Gooding, Tallent, & Matts, 2005; Kwapil, 1998) as well as an important determinant of the social impairment associated with schizophrenia (Blanchard et al., 1998; Meehl, 1962). According to Meehl, (1962), social anhedonia is one of the most consistent behavioral signs of schizophrenia. Based on this theory, social anhedonia has been examined in non-clinical populations as a potential indicator of schizotypy.

Measurement of Social Anhedonia

The Anhedonia-Asociality subscale of the Scale for the Assessment of Negative Symptoms (SANS; Andreasen, 1984) most directly and comprehensively assesses anhedonia when utilizing interview-based assessments in clinical populations. This subscale assesses difficulties in experiencing interest or pleasure. This includes a loss of interest, inability to experience pleasure from activities that are normally considered pleasurable, and a lack of interest and involvement in social activities. The subscale contains four items that are conceptually related to physical and social anhedonia, such as recreational interest and activities, sexual interest and activities, ability to feel intimacy and closeness, and relationships with friends and peers. Items, and a global score, are rated on a 5-point Likert scale (from 0 = not at all to 5 = extreme). Ratings in this subscale can be made using various sources of information by collecting additional information from family members or medical records. Cross-sectional studies using the Anhedonia-Asociality subscale have demonstrated that higher levels Anhedonia-Asociality are related to worse premorbid adjustment (Kitamura & Suga, 1991; Kulhara & Avasthi, 2003; Mueser, Bellack,

Morrison, & Wixted, 1990; Rey, Bailer, Brauer, & Handel, 1994; Sayers, Curran, & Mueser, 1996), lower levels of social competence (Mueser et al., 1990; Bellack, Morrison, Wixted, & Mueser, 1990), and predict poor long-term outcome (Fenton & McGlashan, 1991; Sayers et al., 1996). These findings, while informative, are not solely based on the effect of social anhedonia, as this subscale is related to multiple domains of social functioning that also include aspects of asociality.

Other methods for assessing social anhedonia include the use of self-report questionnaires. The Revised Social Anhedonia Scale (RSAS; Eckblad, Chapman, Chapman, & Mishlove, 1982) and the Physical Anhedonia Scale (PAS; Chapman, Chapman, & Raulin, 1976) are the most frequently administered and standard anhedonia questionnaires in the field. The PAS measures one's ability to experience pleasure related to taste, sight, smell, and touch. Over the decades social anhedonia has been found to be the more useful of the two scales, after a revision of the original social anhedonia scale removed items that assessed for social anxiety. The RSAS is administered to measure individual differences in the capacity to experience pleasure from social-interpersonal sources. The RSAS is a 40-item true-false self-report questionnaire that assesses trait levels of decreased pleasure experienced from interpersonal sources. Examples include: "I attach very little importance to having close friends" (keyed true); and "Although I know I should have affection for certain people, I don't really feel it" (keyed true). Studies examining outpatients with schizophrenia or undergraduates with social anhedonia versus controls have proven the RSAS to be an internally consistent measure (Blanchard et al., 1998; Mishlove & Chapman, 1985).

Studies examining the validity of the RSAS have demonstrated support for its construct validity and diagnostic specificity. Research with clinical populations has found that individuals experiencing acute symptoms of depression and schizophrenia did not significantly differ in elevated RSAS scores during an initial inpatient psychiatric hospitalization as compared with healthy controls (Blanchard et al., 2001). However, depressed mood and RSAS scores significantly decreased to normal levels during follow-up assessments in the depressed group, whereas RSAS scores remained stable and elevated in the schizophrenia patients, despite a reduction in other symptoms. Similar results have been found in other studies of individuals with schizophrenia (Blanchard et al., 1998; Horan, Blanchard, Gangestad, & Kwapil, 2004). These findings suggest that social anhedonia, as measured by the RSAS, reflects an enduring trait in schizophrenia as opposed to a transient state in depression.

Other studies utilizing the RSAS have focused on non-clinical populations. For example, Mishlove and Chapman (1985) compared a sample of male and female college students scoring abnormally high on the RSAS to controls. They found that individuals with social anhedonia experienced more psychotic-like features and more schizotypal symptoms than controls. This demonstrates that social anhedonia independent of a psychiatric diagnosis is linked to factors associated with schizophrenia-spectrum symptomatology. The proceeding section will review studies that have rendered support for social anhedonia.

Current Understanding of Social Anhedonia in Non-Clinical Populations

Research has attempted to examine social anhedonia as a method for identifying putative schizotypes using a psychometric high-risk paradigm. Non-clinical individuals, mostly college students, with elevations on social anhedonia have exhibited clinical, cognitive, and physiological characteristics similar to individuals with schizophrenia and those with a known greater genetic risk for schizophrenia (Chapman et al., 1976; Chapman et al., 1994; Mishlove & Chapman, 1985). Several cross sectional studies have found that individuals elevated on social anhedonia demonstrate clinical characteristics consistent with risk for schizophrenia-spectrum disorders. For example, studies have found that individuals elevated on social anhedonia demonstrate schizoid withdrawal (Mishlove & Chapman. 1985), elevated schizotypal, schizoid, and paranoid personality disorder symptoms (Blanchard et al., in press; Horan et al., 2007; Kwapil, Crump, & Pickup, 2002; Mishlove & Chapman, 1985; Kwapil, 1998), increased psychotic-like experiences (Gooding, Kwapil, & Tallent, 1999; Kwapil et al., 2002; Mishlove & Chapman, 1985), and cognitive slippage (Gooding, Tallent, & Hegyi, 2001). Individuals elevated on social anhedonia also demonstrate cognitive deficits, such as deficits in working memory (Gooding & Tallent, 2003; Tallent & Gooding, 1999), sustained attention (Gooding, Matts, & Rollman, 2006; Kwapil & Diaz, 2000), executive functioning (Gooding et al., 1999; Tallent & Gooding, 1999), and physiological abnormalities (Gooding, 1999; Gooding, Miller, & Kwapil, 2000; Gooding, Shea, & Matts, 2005) that are similar to what is seen in schizophrenia and spectrum disorders. These cross-sectional studies have reported increased schizophrenia-spectrum characteristics within healthy

participants with elevated scores on social anhedonia. Moreover, longitudinal studies have provided robust support for the predictive validity of social anhedonia.

Predictive Validity of Social Anhedonia

Research on social anhedonia attests to its clinical significance as a vulnerability indicator for schizophrenia-spectrum disorders (Chapman et al., 1994; Kwapil, 1998). Chapman et al. (1994) conducted a longitudinal study with nonclinical college students, which found that psychosis proneness (using the Magical Ideation Scale) together with social anhedonia (as measured by the RSAS) significantly predicted schizotypal dimensional scores and psychotic-like experiences at follow-up. Moreover, individuals high on psychosis proneness and social anhedonia displayed the highest rates of psychosis and reported more psychotic-like experiences and schizotypal symptoms at follow-up assessment. Kwapil (1998) extended this study by reassessing Chapman et al.'s data to determine whether social anhedonia independently predicted the development of schizophrenia-spectrum disorders. After statistically controlling for the effects of the psychosis proneness measure, this study found that 24% of college students elevated on social anhedonia were diagnosed with a schizophrenia-spectrum disorder ten years later compared to only 1% of control participants (Kwapil, 1998). This study provided evidence for the predictive ability of social anhedonia. Another study by Gooding, Tallent, and Matts (2005) found that individuals elevated on social anhedonia were more likely to have developed schizotypal, schizoid, or paranoid personality disorders than people scoring high on positive schizotypy or psychosis-proneness traits after five years. Given these

findings, it is evident that social anhedonia appears to be a valid and important construct for identifying individuals vulnerable to schizophrenia-spectrum disorders.

In sum, the research reviewed above provides evidence for the predictive validity of social anhedonia. This research is clinically useful because it allows for a way of identifying those at high risk for developing schizophrenia-spectrum disorders. The ability to identify at-risk individuals may ultimately lead to the development of better prevention and treatment methods. Although the evidence for social anhedonia as a putative indicator is extensive and promising, much is unknown about the characteristics of individuals scoring high on measures of social anhedonia. Arguably, it is important to enhance the current understanding of individuals with social anhedonia; one relevant factor is social functioning given the clear role social isolation seems to play in the development of psychosis in vulnerable individuals. Very little is known about the factors that contribute to the social deficits experienced by individuals with social anhedonia.

SOCIAL ANHEDONIA AND SOCIAL FUNCTIONING

Within schizophrenia, several studies have confirmed that social anhedonia is related to poor social functioning (Blanchard et al., 1998; Cohen at al., 2005; Katsanis, Iacono, Beiser, & Lacey, 1992). Social dysfunction is also evident in non-clinical populations of individuals elevated on social anhedonia who may be at risk for developing schizophrenia-spectrum disorders. Research has shown that people with social anhedonia demonstrate poorer social adjustment (Kwapil, 1998; Mishlove & Chapman, 1985), impaired social functioning (Diaz, Dickerson, & Kwapil, 2002), and less social support (Blanchard & Brown, 1999, Blanchard et al., in press). Several

factors may contribute to the social dysfunction evident in social anhedonia; two considered here are social skills deficits and deficits in emotion expression and experience.

Social Anhedonia and Interpersonal Relationships

Much of the research examining social deficits in social anhedonia has focused on broad indicators of general social functioning. Together, these studies demonstrate that individuals with social anhedonia display deficiencies in social relationships. For example, studies have shown that compared to controls individuals with social anhedonia have fewer friends (Mishlove & Chapman, 1985), more family conflict (Blanchard et al., in press), lower rates of dating and marriage, fewer interpersonal relationships, and lower quality of intimate relationships (Kwapil, 1998). Furthermore, the interpersonal relationships held by these individuals are reported to be less satisfying than controls (Kwapil, 1998). Recent experience-sampling methodology (ESM) studies have attempted to examine social dysfunction in the daily lives of people with social anhedonia. These studies have found that individuals with social anhedonia display social withdrawal, as they interact with others less frequently (Brown, Silvia, Myin-Germeys, & Kwapil, 2007), and when engaged in social situations, they take part in larger and less intimate groups (Kwapil et al., 2009) and demonstrate disengagement and distance (Brown et al., 2007). Although these findings illustrate general social deficits, they do not demonstrate how these individuals actually behave and feel during social interactions. Research examining more specific social skills deficits is needed to better understand the causes of social impairment in social anhedonia.

Social Anhedonia and Social Skill

Even though research on social skills deficits in schizophrenia has proliferated in the last several decades, limited research has been conducted with persons elevated on social anhedonia. Studies examining social skill are based on the premise that social interactions are dependent upon the combined use of specific behavioral components, such as eye contact, voice tone, and verbal content (Bellack et al., 1990). In the general population, these components are naturally acquired through the principles of social learning theory (Bandura, 1969); however, some individuals may be impaired in acquiring these behavioral components. Much research has focused on patients with schizophrenia, and these studies demonstrate that patients tend to have more pronounced social skill deficits compared to other diagnostic groups and non-psychotic controls (Argyle, 1981; Bellack, et al., 1990; Lindsey, 1982; Longabaugh, Eldred, Bell, Sherman, 1966). These skills deficits are in verbal content (request/compliance and praise/appreciation), non-verbal content (gestures, postures, facial expression, gaze, speech duration, conversational pauses, and affect), and overall ratings of social skill and ratings of role functioning.

Studies examining the relationship between social skill and social anhedonia in at-risk populations are scarce; therefore, research is needed to clarify this relationship. One study by Collins, Blanchard, and Biondo (2005) examined the behavioral characteristics of individuals with social anhedonia within a clinical interview using a behavioral rating measure. Compared to controls, individuals with social anhedonia displayed greater constricted facial affect, lack of non-verbal expression, lack of verbal expression, physical anergia, and odd speech. Overall,

individuals with social anhedonia displayed more of the atypical interpersonal behaviors characteristic of schizophrenia-spectrum disorders. Many of these behaviors point to a lack of expressive interpersonal behaviors, and this is consistent with other studies positing that social anhedonia and schizophrenia are marked by deficits in emotional expression (e.g., Berenbaum et al., 1992; Kring, Kerr, Smith, Neale, 1993; Kring, Alpert, Neale, & Harvey, 1994).

While the specific social behaviors exhibited by individuals elevated on social anhedonia are still poorly understood, there is evidence that individuals elevated on schizotypal traits tend to experience rejection by their peers in laboratory paradigms. For example, one recent study found that nonverbal and verbal behaviors play a central role in determining whether people will pursue relationships with individuals with pathological personality traits following interactions (Friedman, Oltmanns, Gleason, Turkhheimer, 2006). Furthermore, recent research indicates that people who exhibit symptoms of schizotypy are viewed unfavorably by peers (Oltmanns, Friedman, Fiedler, & Turkenheimer, 2004) and are rated as less attractive (South, Oltmanns, & Turkheimer, 2005). Further research is needed to examine whether individuals with social anhedonia also behave in a manner that evoke negative social reactions. Particularly, examining certain aspects of social skill, such as conversational [verbal] content and nonverbal behaviors of individuals with social anhedonia, could provide insight into the behavioral characteristics that may affect how peers perceive individuals high in social anhedonia. Moreover, understanding the social behaviors of individuals elevated on social anhedonia may provide insight into the social impairments seen in schizophrenia-spectrum disorders.

It is evident that social skill deficits contribute to the social impairments seen in schizophrenia, but there is limited research investigating how social skill may also play a role in the social impairments seen in individuals elevated on social anhedonia. However, other factors including emotional expression and experience may also contribute to the social functioning deficits observed in individuals with social anhedonia. The following section will review current knowledge of the emotional characteristics seen in individuals with social anhedonia, and how it may contribute to social difficulties.

SOCIAL ANHEDONIA AND EMOTION

Much of the research focusing on the emotional characteristics of social anhedonia has stemmed from theories proposing that schizophrenia and spectrum disorders are marked by disturbances in emotional expression and experience. Early theorists, such as Bleuler (1919, 1950) and Kraeplin (1919, 1971), identified emotional deficits observed in schizophrenia, such as paucity of emotional expression, diminished emotional experience, and inappropriate affect. Bleuler (1950) described a discrepancy between schizophrenic patients' emotional expression and emotional experience, with patients being able to experience strong emotions but not express them. In contrast, Rado's (1953) theory suggested that individuals with schizophrenia lacked outward expression because of an inability to experience pleasurable emotion. Recently, developments in basic emotion research have led researchers to examine the expressive and experiential aspects of emotion in schizophrenia and spectrum disorders via laboratory studies involving emotionally evocative stimuli, such as film clips, picture slides, flavored drinks, and role-plays

(Berenbaum & Oltmanns, 1992; Blanchard, Kring, & Neale, 1994; Burbridge & Barch, 2007; Fitzgibbons & Simons, 1992; Horan, Kring, & Blanchard, 2006; Kring, Kerr, & Earnst, 1999). However, few studies have attempted to systematically characterize the emotional nature of social anhedonia in at-risk individuals and how it relates to social dysfunction.

Social Anhedonia and Emotional Expression

Research has found that social impairments observed in individuals with anhedonia may be related to the deficits in the outward expression of emotion (Blanchard, Cohen, & Carreno, 2007). It is therefore important to study emotional expression in at-risk individuals with social anhedonia since it has clear implications for social relationships. Emotion expression research usually involves coding facial affect while a participant views emotion-eliciting film clips or slides. Kring, Smith, and Neale (1994) reported that social anhedonia is negatively correlated with a well-validated self-report measure of emotional expressivity, such that greater social anhedonia is related to fewer self-reported outward displays of emotion. Furthermore, some studies have found that socially anhedonic individuals demonstrate diminished emotional expressivity (Collins, Blanchard, & Biondo, 2005; Kring et al., 1994).

Examining the outward expressive behavior of individuals with social anhedonia may provide information on the expressive/behavioral components that may underlie their social dysfunction. Reduced expression of affect during social interactions has been found to evoke neutral feelings from peers, and leads participants to report less social support (Gross & John, 2003). Other studies have demonstrated that individuals who suppress emotional expressions during

conversation dyads are liked less by their conversation partner (Butler et al., 2003). These studies show that deficits in emotional expression may have adverse effects on interpersonal relationships, as peers may not wish to engage in future conversations and friendships with people who display blunted affect. In sum, facial expression plays a central role in social communication (Blanchard & Panzarella, 1998). Since facial expressions serve as indicators of emotion in social situations, individuals with social anhedonia, who typically display constricted facial expressions, may experience difficulties in social interactions.

Social Anhedonia and Emotional Experience

Another emotional characteristic that may be useful in understanding social dysfunction in social anhedonia is emotional experience. The emotional nature of social anhedonia has been understood in terms of trait affectivity. Trait positive affect (PA) refers to the tendency to experience positive or rewarding emotional states, willingness to engage with others, and a low reactivity to negative stimuli (Clark & Watson, 1999). Trait negative affect (NA) refers to the tendency to experience negative emotional states, to perceive the world as negative, and a heightened reactivity to stress (Watson & Walker, 1996). Social anhedonia within schizophrenia is associated with diminished PA and increased NA (Blanchard et al., 1998), and this association is found to be stable across different clinical states (Blanchard et al., 2001). Trait PA and NA have been informative in understanding individual differences in affectivity in schizophrenia, and several researchers have tried to extend this concept to non-clinical individuals elevated on social anhedonia.

It has been theorized that social anhedonia in non-clinical individuals is also characterized by decreased PA and increased NA (Blanchard et al., in press; Gooding, Davidson, Putman, Tallent, 2002; Leung, Couture, Blanchard, Lin, Llerena, 2010), yet contradictions in the social anhedonia literature concerning emotional experience exist. Several studies disagree on how these individuals differ in their experience of NA. Some studies have found that individuals elevated on social anhedonia are more likely to be low in PA but not high in NA (Brown et al., 2007; Brown et al., 2008; Kwapil at al., 2006). A study by Kerns, Docherty, and Martin (2008) using multiple assessments of emotional experience, such as naturalistic and lab contexts and social and non-social situations, found that individuals with social anhedonia reported less intensity of PA than both controls and people elevated on perceptual aberration-magical ideation, but social anhedonia was not associated with NA intensity. Recent studies have also examined patterns of social dysfunction in the daily lives of people with social anhedonia using experience sampling methodology (ESM). For example, one ESM study found that socially anhedonic people are more likely to be high in negative schizotypy, low in PA but not high in NA, and demonstrate a general pattern of social disinterest and withdrawal (Brown et al., 2007). A more recent study examining social anhedonia within a community setting found that social anhedonia participants reported significantly elevated trait NA and significantly lower PA compared to controls (Blanchard et al., in press). This study also found that individuals with social anhedonia reported reduced social relationships and lower social support than controls. Even though it is unclear how individuals with social anhedonia experience negative emotion, results from several studies suggest that

social anhedonia may be associated with a general decrease in PA for both lab stimuli and in daily life situations. However, previous studies have not examined emotional experience in laboratory settings in which participants are socially engaged with the stimuli, such as believing they are socially interacting with another participant.

The preceding overview of the emotional nature of social anhedonia generally demonstrates that the emotional experience and expression of individuals high in social anhedonia are similar to what is seen in schizophrenia. Individuals elevated on social anhedonia display reduced facial expressions during social situations and report experiencing less positive emotions. These deficits may account for the social difficulties reported among individuals with social anhedonia. According to Rado's theory, individuals with schizophrenia lack outward expression because of an inability to experience pleasurable emotion. If Rado's theory holds true for at-risk individuals, then it is expected that individuals with social anhedonia will not succeed in interpersonal settings because of deficits in both emotional expression and experience. Understanding the emotional nature of social anhedonia might provide insight into the nature of the social functioning deficits seen in schizophrenia-spectrum disorders.

METHODOLOGICAL LIMITATIONS OF CURRENT STIMULI

Little is known about emotion and social skill in social anhedonia. There are contradictions in the literature regarding emotional experience in both schizophrenia and social anhedonia. Most studies of emotion in social anhedonia use inadequate stimuli to elicit affective responses (Blanchard, 1998). Specifically, the stimuli being used are not usually based on social or interpersonal contexts that accurately examine

the social pleasure deficits that underlie social anhedonia. Studies have relied on coding behaviors from evocative film clips, taste tests, and retrospective self-reports that do not capture what people actually do in social initiation contexts. Contradictions in the literature regarding emotional expression and experience may also be explained by the use of inadequate stimuli that do not accurately capture the social hedonic deficits presumed to underlie social anhedonia. Thus, a simulated social interaction may better elicit social affiliative experiences and help clarify the affective and behavioral components of social anhedonia.

SUMMARY OF CURRENT KNOWLEDGE

The preceding review demonstrates that social anhedonia is a core feature of the liability for developing schizophrenia-spectrum disorders. Social anhedonia has been linked to social impairments that put individuals at greater risk for developing schizophrenia. Although a number of investigations have focused on social anhedonia in individuals with schizophrenia, less is known about the emotional characteristics, social behaviors, and interpersonal functioning of at-risk individuals elevated on social anhedonia. Studies have found that individuals with social anhedonia experience lower rates of dating and marriage, fewer interpersonal relationships, and fewer social supports. These findings reflect broad indicators of general social functioning that do not tap into specific social skill deficits that may account for the interpersonal dysfunction evident in social anhedonia. Even though it is postulated that social interactions are dependent on the use of specific behavioral components (i.e., social skill), studies examining social skill in social anhedonia are scarce. ESM studies have attempted to examine the social behaviors and emotional experience of

individuals with social anhedonia in their daily lives. While these studies have found that individuals high in social anhedonia experience less positive affect during social interactions, participate in larger and less intimate groups, and prefer to be alone, these studies have not examined how they actually behave during social interactions. Finally, to date there are no studies that have simultaneously examined emotional experience and expression and social skill within social anhedonia. It is proposed that some social deficits exhibited by individuals with social anhedonia may be related to diminished emotion expression and experience. In order to understand how individuals with social anhedonia interact and how they react to others during social situations, the current study examined the social behaviors of individuals with social anhedonia, and obtained self-reports of their experiential reactions during a simulated social interaction.

CHAPTER 2: STUDY HYPOTHESES

Although studies have shown that individuals with social anhedonia have lower rates of interpersonal relationships and they enjoy social encounters less, there is a dearth of research investigating the nature of social relationships experienced by individuals with social anhedonia. The purpose of this study is twofold. First, this study aims to learn more about the social behaviors and emotional responses of individuals with social anhedonia during social interactions. Second, the current study developed and evaluated a simulated social interaction to examine whether individuals with social anhedonia behave differently in social interactions compared to controls and to better understand the role of emotion expression and emotion experience within social situations.

Specifically, this study examined the following hypotheses:

1. It was expected that individuals with social anhedonia would report fewer social supports and poorer social functioning as compared to controls.
2. Compared to controls, participants with social anhedonia would display less social skill during a simulated social interaction.
3. Compared to controls, participants with social anhedonia would be characterized by reduced emotional expression, as determined by facial expressivity, in response to the social interaction.
4. It was also expected that participants with social anhedonia would report experiencing less positive affect in response to the social interaction compared to controls.

5. Compared to controls, individuals with social anhedonia would demonstrate less affiliative reactions toward their partner, for example the participant would be more likely to rate conversing with their partner as less enjoyable, trusting their partner less, and viewing their partner as less warm and caring. Furthermore, compared to controls, individuals with social anhedonia would demonstrate less willingness to engage in future social interactions with their partner (actor).
6. To examine if social behaviors were related to emotional responses in the social anhedonia group, the current study examined whether observer-rated social skill was related to emotional expression (FACES), self-reported emotional experience (PANAS), positive reactions to the confederate, and willingness to interact with the confederate.
7. Finally, the current study examined whether social functioning was associated with social behaviors and emotional responses to the simulated social interaction.

CHAPTER 3: METHODS

PARTICIPANTS

Study participants were recruited from a mass testing pool of approximately 998 college students and from 356 responders to flyers posted throughout the campus. Participants were between the ages of 18 and 30 years who attended a large public university in Maryland. Individuals completed a screening questionnaire, the Revised Social Anhedonia Scale (RSAS; Eckblad, Chapman, Chapman, & Mishlove, 1982) online. A total of 1,354 participants completed the screening questionnaire. Individuals were excluded if they endorsed three or more items in the unexpected direction on the RSAS Infrequency Scale. Approximately 8% of individuals who completed the screening questionnaire were excluded based on scores of 3 or above on the Infrequency Scale. This percentage is near to the 1% - 7% observed in the literature (Chapman, Chapman, & Raulin, 1976; Fonseca-Pedrero et al., 2009; Kwapil et al., 2009; Leung, 2006), but is slightly higher given that participants completed a variety of other measures during mass testing and some participants may have responded inaccurately due to fatigue or boredom. Individuals scoring within the top 10% of RSAS scores within each gender were identified as elevated on social anhedonia. Individuals with scores within 0.5 standard deviations of the mean were identified as potential control participants. These cut-off scores have been used throughout the literature and seem to effectively identify anhedonic and control groups (Chapman et al., 1994; Kwapil et al., 1998).

Of the 1,354 that completed the screening questionnaire, approximately 94 individuals were elevated on social anhedonia and 273 controls were identified using

the selection criteria outlined above. Potential participants were contacted via telephone and/or E-mail and invited to participate in the current study. Upon arrival to the study site, each participant reviewed and signed the study's consent form. The final sample included 42 individuals elevated on social anhedonia and 54 controls. See Table 1 for demographic information. Participants were between the ages of 18 and 30, with an average age of 20. An independent samples t-test showed no significant group differences on age, t (94) = 1.15, p = .25. This sample was comprised of 62% Whites, 18% Blacks, 3% Hispanics, 11% Asian, and 5% described themselves as multi-racial. Chi-square analyses of the recruited participants revealed no differences between individuals with social anhedonia and controls on race, χ^2 (4) = 3.10, p = .54. Chi-square analyses showed that there were significant differences between individuals with social anhedonia and controls on gender, χ^2 (1) = 5.97, p = .02. The percentage of males in the social anhedonia group was 23.8% compared to 48.1% in the control group. The social anhedonia group consisted of 32 females and 10 males, and the control group consisted of 28 females and 26 males. All participants were compensated for their participation with monetary payment or course research credit. Of note, only participants responding to posted flyers were entered into three lottery prize drawings for $50 upon completion of the online questionnaire.

MEASURES

Revised Social Anhedonia Scale (RSAS)

The RSAS (Eckblad et al., 1982; see Appendix A) was administered to screen for individuals with social anhedonia and to identify the control group. The RSAS is a

40-item true and false self-report questionnaire that assesses trait levels of decreased pleasure experienced from interpersonal sources. Examples include: "I attach very little importance to having close friends" (keyed true); and "Although I know I should have affection for certain people, I don't really feel it" (keyed true). The RSAS has shown to be a valid (Mishlove & Chapman, 1985) and internally consistent measure with coefficient alphas between 0.79 and 0.84 (Blanchard, et al., 1998; Mishlove & Chapman, 1985). It has also demonstrated high test-retest reliability over a 90-day period with a stability coefficient of 0.79, and over a 1-year period with a stability coefficient of 0.72 (Blanchard et al., 1998; Blanchard et al., 2001).

The Infrequency Scale (Chapman & Chapman, 1976; see Appendix B) is a 17-item true and false scale that was designed as an invalidity index for the RSAS. It was administered to identify invalid responses. Individuals obtaining three or greater responses in the unexpected direction were excluded from the study as they suggest invalid responding.

Schizotypal Personality Questionnaire (SPQ)

The SPQ (Raine, 1991; see Appendix C) is a 74-item dichotomous (yes/no) questionnaire that assesses the range of symptoms found in the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-III-R; American Psychiatric Association, 1987) criteria for schizotypal personality disorder. In the present study, the SPQ was administered to determine if individuals elevated on social anhedonia (RSAS) were also elevated on schizotypal personality traits. The SPQ consists of nine subscales: ideas of reference, excessive social anxiety, odd beliefs or magical thinking, unusual perceptual experience, odd or eccentric behavior, no close friends,

odd speech, constricted affect, and suspiciousness. Replicated across samples, the SPQ has demonstrated high sampling validity, high internal reliability (0.91), test-retest reliability (0.82), convergent validity (0.59 – 0.81), discriminant validity, and criterion validity (0.62, 0.68) (Raine, 1991). One study reported on the temporal stability of the subscales, which ranged from 0.71 to 0.85 over a period of three weeks (Poreh, Levin, Teves, & States, 1997). SPQ subscales have been significantly correlated with other measures of schizotypal personality features, such as the RSAS, the Magical Ideation Scale (Eckblad & Chapman, 1983), and the Perceptual Aberration Scale (Chapman et al., 1978). The SPQ is useful in screening for schizotypy in the general population, and is the most widely used measure of schizotypy (Wuthrich & Bates, 2006).

Beck Depression Inventory

The BDI (Beck, 1961) is a 21-item questionnaire that covers cognitive, motivational, and physiological areas of depressive symptoms in adults. Each item consists of four statements graded in severity from 0 to 3. Each participant is asked to endorse the statement that best describes the way he or she has been feeling in the past week, including today. A total score ranging from 0 to 63 is calculated by summing the severity ratings of the endorsed statements. Scores ranging from 0 to 10 indicate no depressive symptoms, scores from 11 to 16 suggest a mild level of mood disturbance, and scores from 17 to 23 and 24 to 63 indicate moderate and severe levels of depressive symptoms respectively (Beck, 1961). The BDI has acceptable internal consistency and test-retest reliability ratings and has been reported to be a

valid instrument for use with clinical and nonclinical populations (Bumberry, Oliver, & McClure, 1978; Beck, 1961).

Social Adjustment Scale: Short (SAS-SR)

The SAS-SR (Weissman & Bothwell, 1976; see Appendix D) is a 27-item, self-report measure designed to assess instrumental and expressive role performance over the past two weeks. Derived from an interview form, the SAS-SR asks participants about their role performance, interpersonal relationships, friction, feelings and satisfaction in work/school, social and leisure activities, relationships with extended family, and perception of economic functioning. These items fall into four main domains—performance at expected tasks, amount of interpersonal discord, elements of interpersonal relationships, and personal feelings and satisfactions (Weissman et al., 1978). For each item, individuals must indicate their response on a scale from 1-5, with higher scores denoting poorer functioning. Self-report results from the SAS-SR are comparable to social functioning ratings obtained from relatives and other raters. Though initially developed for use with individuals with depression, the SAS-SR has also been used in nonpsychiatric and nonpatient populations. This measure reliably differentiates between psychiatrically ill and well patients, and it has few significant correlations with demographic variables (Weissman, Olfson, Gameroff, Feder, & Fuentes, 2001). The SAS-SR demonstrates good internal consistency ($\alpha = 0.74$) and test-retest reliability ($r = 0.80$). This measure is significantly correlated with other measures of social functioning (Weissman et al., 2001). Overall, the SAS-SR is considered one of the best measures of social well-being in terms of reliability and validity (Larson, 1993).

Social Support Questionnaire (SSQ)

The SSQ (Sarason, Sarason, Shearin, & Pierce, 1987; Sarason, Levine, Basham, & Sarason, 1983; see Appendix E) was used to assess the perceived number of social supports. Participants were asked to list all of the individuals they feel they can rely on for support in various situations. This measure demonstrates high test-retest reliability ($r = 0.84$) and high internal consistency ($\alpha > 0.90$), and the SSQ has also been shown to have good convergent validity with other measures of social support (O'Reilly, 1995; Sarason et al., 1987). When compared with a detailed structured interview, the SSQ provides comparable results (Sarason et al., 1987).

Social Affiliation Interaction Task

One film clip was developed for this study to elicit affiliative social behaviors and positive emotion from participants. In this simulated social interaction, participants were led to believe that the confederate in this clip was an actual participant in another room that would be interacting with them via a closed-circuit video camera. The clip involved a pre-recorded female confederate who was depicted as a relaxed, friendly, and outgoing person, with an enjoyment for engaging in a variety of activities with others, such as watching T.V., going to parties, and going to school sporting events. The confederate was recruited through a newsletter ad distributed through the University of Maryland Theater Department, and she was selected to be attractive and able to present herself as natural and friendly. The confederate pre-recorded clip lasted two minutes and forty-three seconds, and the authors scripted the content of the confederate's monologue (see Procedure). Each participant was asked to respond to the confederate who they believed would also be

watching him/her from the other room. Participants were recorded while they watched the confederate's introduction and while they responded to the confederate.

Social Skill

Social skill ratings in the present study were created to capture the core interpersonal skills involved in affiliative social interactions. Independent coders blind to group status rated participants' social skill during the social interaction using a social skills manual developed specifically for the current study (see Appendix F). Social skill was rated based on several components, which include verbal/conversational content, non-verbal content, affiliation, and overall social skill. The verbal content domain refers to the actual content of the person's speech. A high rating is reserved for someone who introduces him/herself (e.g., gives name, where s/he is from, age, etc.); describes his/her family and friends; and talks about many interests, hobbies, and favorite activities with family and friends. Nonverbal content refers to how the participant speaks, and not what s/he says. This rating takes into account clarity (clear enunciation of speech), fluency (smoothness of speech; absence of verbal interruptions), appropriate affect (communication of feeling that is appropriate to the conversation through facial expression, use of gestures, and vocal tone), and eye contact. Social skill ratings include degree of affiliation, or the extent to which the participant demonstrates that he/she is engaged and involved in the interaction with the other person. A high rating in affiliation is appropriate for participants who display friendliness and subjective feelings and attitudes of affection and warmth. Finally, overall social skill is a general measure of the participant's social competence and their ability to interact in an affiliative and meaningful way,

and it subsumes all of the other variables that are coded. Items are rated on a 5-point Likert scale ranging from very poor (1) to very good (5). Raters coded social skill while the participant responded to the confederate. Other studies have used similar behavioral rating procedures in situations where participants are told to interact with unfamiliar individuals (i.e., a research confederate) when the goal of the interaction is to get to know one another (Penn, Hope, Spaulding, & Kucera, 1994; Pinkham, Penn, Perkins, Graham, & Siegel, 2007; Sayers, Bellack, Wade, Bennett, & Fong, 1995).

Undergraduate coders blind to group status performed social skills ratings. Interrater agreement between the coders was established during the training period, using videotaped subjects not included in this study. Once trained, coders were periodically assessed for coder drift. All coders rated all participant clips. Interrater agreement for Social Skill was calculated using an intra-class correlation (ICC). The agreement between the two raters was calculated across subjects for each of the social skills components. Cronbach's alpha for rater agreement ranged from .87 to .93 indicating high agreement between raters.

Facial Expression Coding System (FACES)

Facial expressions in response to the social interaction were rated using FACES (Kring & Sloan, 1991, 1997; see Appendix G), a behavioral coding system based on a two-dimensional model of emotion in which each emotion varies on valence (positive or negative) and intensity (low or high). FACES was designed to be a reliable and time efficient measure of facial expression that provides accurate information about the frequency, intensity, valence, and duration of facial expressions. The coding system used in the current study involved making separate

frequency counts for positive and negative facial expressions, and assessing their duration and intensity in two clips; while the participant watches the actress (confederate) introduce herself and while the participant introduces him/herself. Raters coded 2 minutes and 42 seconds of each clip to match the duration of the confederate's introduction. An emotional expression was coded if a facial display shifted from neutral to a non-neutral display, and back to a neutral display. Differences in valence of the display were considered separate expressions. Each facial expression was rated on duration (seconds) and intensity (from 1 = low to 4 = high). Furthermore, facial expressions were rated independent of speech; therefore FACES ratings were made without audio. Several studies have all reported high rater agreement among raters using FACES (Kring et al., 1994; Kring & Earnst, 1999; Kring et al., 1993; Kring & Neale, 1996; Salem & Kring, 1999). A study of emotional responding in schizophrenia reported high test–retest reliability of FACES ratings for schizophrenia patients and nonpatient controls (Kring & Earnst, 1999). Other studies provide evidence for the validity of FACES. For example, facial expression variables derived from FACES are related to self-reports of emotional expressiveness (Kring et al., 1994), clinical symptom ratings of diminished expressiveness (Kring et al., 1994), vocal expressive behavior (Kring et al., 1994), and reports of experienced emotion (Kring & Earnst, 2003; Sloan et al., 1997, 2001).

Undergraduate raters, blind to group status, were trained to perform FACES ratings using videotaped subjects not included in this study. Once trained, coders participated in regular consensus meetings and were periodically assessed for coder drift. Twenty of the same participants' data were compared to check for interrater

agreement between two raters. Cronbach's alpha on all FACES components ranged from .85 to 1.00 indicating high interrater agreement.

Positive and Negative Affect Schedule (PANAS)

The PANAS (Watson, Clark, and Tellegen, 1988; see Appendix H) is a 20-item self-report measure designed to provide a quick, reliable, and valid measure of positive and negative affect. The scales include terms such as active, enthusiastic, afraid, and distressed. Four additional items measuring affiliative emotions were included in this measure: friendly, rejected, lonely, and sociable. Affective terms are rated on a 5-point Likert scale (1 = very slightly or not at all and 5 = extremely) based on how the participant feels "right now" and in response to the evocative stimulus. Mood induction studies on non-clinical populations composed of female college students have shown that PA and NA are found to be independent of each other (Egloff, 1998). A more recent study by Franken, Rassin, and Muris (2007) reported Cronbach's alphas for PA and NA as 0.78 and 0.90 respectively. Watson et al. (1988) used undergraduate samples to examine the psychometric properties of the PANAS. They found that the PA and NA scales are internally consistent and have excellent convergent and discriminant validity, as they correlate with lengthier measures of the underlying mood factors. They also demonstrate appropriate stability over a 2-month time period. When used with short-term instructions (e.g., right now or today), they are sensitive to fluctuations in mood, whereas they exhibit trait-like stability when long-term instructions are used (e.g., past year or general). The scales correlate at predicted levels with measures of related constructs and show the same pattern of relations with external variables that have been seen in other studies. Other studies

have successfully used the PANAS to assess affect following mood-inducing stimuli (Kuehner, Holzhauer, & Huffziger, 2007; Randall & Cox, 2001). In the current study, the PANAS was used with short-term instructions, such as *right now*, to evaluate emotional reactions before and after the simulated social interaction.

Willingness to Interact Scale (WILL)

The WILL (Coyne, 1976; see Appendix I) is a 6-item assessment of participants' willingness to engage in interactions with a specific target, which in this study is the confederate/actor that the participant meets. Examples of items include, "How willing would you be to go to a movie with this person?" and "How willing would you be to ask this person for advice?" Responses are rated on a 5-point Likert scale from 1 (definitely willing) to 5 (definitely unwilling), thus lower scores reflect greater willingness to interact. The WILL demonstrates good internal consistency ($\alpha = 0.85$; Joiner & Metalsky, 1995), and other studies have found support for its reliability and construct validity (Burchill & Stiles, 1988; Coyne, 1976).

Positive Reactions to Partner (PRP)

To assess how pleasant the participant views the confederate, several items assessed how much the participant liked interacting with the confederate (i.e., " I liked talking to my partner," "I trust my partner", "My partner seemed like a warm, caring person," "I enjoyed our conversation," and "I care about how I was perceived by my partner") (see Appendix J). Items are rated on a 5-point Likert scale from 1 (completely agree) to 5 (completely disagree), thus lower scores reflect more positive reactions toward the confederate. For the present study, items in this measure were chosen to evaluate the affiliative reactions of participants and their subjective

impressions of their partner based on findings that affiliation is tied to factors such as likeability, kindness, and trust (Cottrell, Neuberg, & Li, 2007).

Post-Experimental Inquiry (PEI)

A post-experimental inquiry served as a manipulation check to assess whether participants were suspicious of the procedures and aware of any deception during their participation in the study (see Appendix K). Subjects were asked what they thought of the study, and whether they thought there was more to the study than they were told about. If participants thought there was deception involved, they were prompted to identify what in the study they were suspicious about. Depending on their answer, the experimenter coded their response as (1) not aware of deception; (2) participant was fully aware of deception; (3) participant was somewhat aware of deception and/or was suspicious but could not come up with a specific answer. The goal of this inquiry was to identify participants whose behaviors were affected by an awareness of the deception rather than a natural response to the manipulation (Taylor & Sheppard, 1996).

PROCEDURE

Participants were recruited from the University of Maryland for a study on how people get to know one another. After being selected based on their responses to the RSAS, participants were phoned or emailed by one of the study coordinators to assess interest in study participation (see Appendix L for email/phone script). Participants were assessed individually. Upon arrival, participants were read the following overview of study procedures by the experimenter:

You will be randomly paired with another participant. You will be in separate rooms, and each person will have an opportunity to introduce himself/herself to the other person via a closed-circuit video camera. Each participant's introduction will be videotaped and streamed to the other participant's television.

However, the "other participant" was a confederate whose pre-recorded introduction was scripted and pre-taped. One clip with a female confederate was available. Each participant was led to a room with a color television and a video camera. After participants provided informed consent, the experimenter read the following statement, after which s/he left the room:

We are interested in studying how people get to know one another, especially when it comes to talking about things we like to do with our friends and family. On the television screen, you will see another participant who is being videotaped live in one of the other rooms. The other participant will appear on the monitor and introduce himself/herself. Just as you will be able to see and hear her on your television screen, she will be able to see and hear you when it is your turn to talk. However, when introducing yourself, you will not be able to converse or talk back and forth with each other. The other participant has been read the same instructions— we tossed a coin, and it turns out the other participant will speak first. She will introduce herself, then soon after your television screen goes black, it will be your turn. Just relax and be yourself. Be sure to convey enough information about yourself so that the other person feels

like they know you. For example, you can talk about what you like to do in your free time and what you like about your friends and family. When you are done introducing yourself, let us know you have finished. Do you have any questions?

The social affiliation interaction task began two minutes later when the confederate ("other participant"; the pre-recorded actress) appeared on the monitor and introduced herself. The confederate was depicted as relaxed, friendly, and outgoing, with an enjoyment for engaging in a variety of activities with others. The confederate pre-recorded clip lasted two minutes and forty-three seconds and the authors scripted the content of the confederate's monologue:

Hi, I'm Whitney. I have been asked to talk about what I like to do in my free time with other people, so here goes. Let's see, I have a close group of friends that I like to hang out with. We usually just hang out and watch T.V., or just joke around with each other. We'll sometimes go grab a bite to eat or run errands together. We've gone to a few football and basketball games too, and that's been pretty fun. Some people joke I should list texting my friends as one of my hobbies, but I always like to know what is going on with them. What I like most about my friends is that they have been there for me through some tough times. Actually, if any of us have a bad day, we get together and cheer each other up. They are all important to me – it's great to have someone who you can say anything with. And more than that, we're just always ourselves, so we can have a good time doing just about anything.

Now that I'm thinking about it, I guess I like being around people in general. I enjoy meeting new people because I feel like I have so much to learn from them. It's always fun to hear about what other people have experienced.

Oh, I also like spending time with my family when I get the chance. Even though they can be challenging sometimes, I miss having them around. I miss my mom's cooking, and generally just getting together. In our family, we really share a lot of interests. They've always been supportive of me – especially my brother. We've always given each other advice and try to look out for each other. There's never a dull moment when he's around – he's hilarious.

Let's see, in addition to my friends and family, I just enjoy all the usual things like watching some sports, seeing movies, and whatnot. Usually I get together with someone to do things. So these are some things that I like to do. How about you?

After the confederate's introduction, the monitor went blank and the participant responded to the confederate for as long as he/she wished. A second experimenter in a nearby room synchronized the interaction between the videotaped interviewer and the participant. Participants' responses to the confederate were recorded. After the participants completed their response, they completed the battery

of self-report measures. After completing the measures and the PEI, participants were fully debriefed as to the true nature of the study (see Appendix M for debriefing script). Participants were compensated with monetary payment or course credit.

CHAPTER 4: RESULTS

OVERVIEW

Statistical analyses were conducted in several stages to evaluate the research questions and to analyze the hypotheses outlined in the previous chapters. First, participant characteristics (e.g., schizophrenia-spectrum personality characteristics and depression scores) were assessed. Next, group differences (social anhedonia group vs. control group) on self-reported social functioning and social support were assessed to determine if individuals with social anhedonia in this sample reported impairments in social functioning consistent with findings in the literature. Following this, the social behaviors of individuals with social anhedonia versus controls were assessed by examining group differences in observer-rated social skill during the social interaction. This was followed by investigating group differences in emotional expressivity and responsivity to the social interaction. This included examining observer-rated facial affect while the participant viewed the confederate's introduction and while the participant responded to the confederate. Group differences in self-reported mood, positive reactions towards the confederate, and willingness to interact with the confederate were also tested to assess emotional responses to the simulated social interaction. Given gender disparities within the sample, the effect of gender was examined in variables such as social skill, emotion expression, emotion experience, and positive reactions to and willingness to interact with the confederate. Next, correlation analyses were conducted in the social anhedonia group to determine the relationship among social behaviors, emotional responses, and social functioning. Missing data points on self-report measures, such

as the SPQ, SAS, and SSQ, were substituted with the series mean. This procedure is a common method of dealing with missing data (Winer, Brown, & Michels, 1991). Demographic characteristics of individuals elevated on social anhedonia and controls are listed in Table 1.

PARTICIPANT CHARACTERISTICS

Schizotypal Personality Traits

Group differences in schizotypal traits were examined by conducting a MANOVA on the SPQ subscales. As shown in Table 2, there was a significant effect of group on schizotypal personality traits, $F(9, 86) = 5.42$, $p < .001$. Separate one-way ANOVAs on the outcome variables revealed significant group effects on subscales of social anxiety ($F(1, 94) = 11.02$, $p < .001$), no friends ($F(1, 94) < 44.23$, $p = .001$), constricted affect ($F(1, 94) = 9.64$, $p < .001$), suspiciousness ($F(1, 94) = 7.99$, $p = .01$), and total SPQ scores ($F(1, 94) = 11.34$, $p < .001$). There were no group differences on subscales of ideas of reference, odd beliefs, perceptual experiences, eccentric behavior, and odd speech, all p's > .05. Results demonstrated that individuals with social anhedonia were elevated on schizotypal personality traits pertaining to the social domain (anxiety, lack of friends, suspiciousness) compared to controls, but not to other traits relating to perceptual anomalies or unusual beliefs.

Depressive Symptoms

As seen in Table 2, groups significantly differed on depression scores based on the BDI-II, $F(1, 94) = 5.10$, $p = .03$. Specifically, individuals elevated on social anhedonia scored higher on depressive symptoms than controls. The impact of these results is discussed further in exploratory analyses.

SOCIAL FUNCTIONING AND SOCIAL SUPPORT

Descriptive statistics for social functioning and social support measures are presented in Table 3. A one-way ANOVA was conducted to determine group differences in social functioning using the SAS-SR. Results showed a significant effect of group on social functioning, $F(1, 94) = 16.17$, $p < .001$. As expected, persons with social anhedonia showed more impaired social functioning relative to controls. Furthermore, to determine whether the social anhedonia group differed from controls in the number and satisfaction with social supports using the SSQ, two separate one-way ANOVAs were conducted. There were significant effects of group on number of social supports, $F(1, 94) = 10.87$, $p < .001$, and satisfaction with social supports, $F(1, 94) = 11.07$, $p < .001$, reported by participants. As expected, the social anhedonia group reported fewer social supports and less satisfaction with the number of people they can depend on for social support compared to controls.

SOCIAL SKILL

To analyze whether participants with social anhedonia demonstrated lower ratings of social skill than control participants during the simulated social interaction, a series of one-way ANOVAs were conducted separately with group as the independent variable and observer ratings of social skill components (verbal, nonverbal, affiliation, overall) as the dependent variables. Results showed that individuals with social anhedonia received lower ratings of affiliation, $F(1, 91) = 6.04$, $p = 0.02$, $d = .50$, and overall social skill, $F(1, 91) = 4.70$, $p = .03$, $d = .44$, compared to controls (see Table 4 for descriptive statistics and effect sizes), but no significant group differences emerged for verbal and nonverbal content, all p's $> .05$

(d = .37 and d = .36 respectively). Given gender disparities between groups, a series of univariate ANOVAs were conducted with group and gender as the independent variables and ratings of social skill as the dependent variables, however there was no main effect of gender nor were there significant interactions of group and gender on any of the social skills components, all p's > .05. In general, results revealed that individuals elevated on social anhedonia were rated as less competent in their ability to interact in an affiliative and meaningful way with the confederate compared to controls.

EMOTION EXPRESSION

Group differences in observer-rated positive and negative facial expression during the social interaction (expressions while viewing the confederate's introduction vs. expressions during the participant's response) were examined. Means and standard deviations are presented in Table 5. First, correlations between the individual FACES variables, computed separately for individuals with social anhedonia and controls were calculated, and they are reported in Table 6. Within both conditions (viewing the confederate's introduction vs. participant response) positive expression frequency, intensity, and duration were highly correlated. Similarly, negative expression frequency, intensity, and duration were highly correlated. To address this multicollinearity and to reduce the number of dependent variables in this analysis, only frequency ratings were used to assess expressiveness during the social interaction. This procedure has been used with FACES data in studies examining facial expression in individuals with schizophrenia compared to healthy controls (e.g., Aghevli, Blanchard, & Horan, 2003; Kring & Neale, 1996). To determine group

differences in facial expression, frequency ratings were entered in to a 2 (group: social anhedonia vs. control) × 2 (condition: viewing confederate vs. responding to confederate) repeated measures ANOVA conducted separately for positive and negative expression.

Positive Facial Expressivity

For positive facial expressiveness, there was a main effect of condition, $F(1, 89) = 27.51$, $p < .05$. Examination of marginal means showed that participants displayed more positive affect while they responded to the confederate ($M = 6.22$, $SD = .46$) than when they passively viewed the confederate ($M = 3.28$, $SD = .49$). The group main effect, $F(1,89) = .21$, $p > .05$, and the Group × Condition interaction were nonsignificant, $F(1,89) = .22$, $p > .05$. Given the gender discrepancy in the current sample and the tendency for women to exhibit more facial expressions than men in social situations (Kring & Gordon, 1998), we repeated the above analysis including the effects of gender. Results mimicked that of the above analysis, except for a significant Gender × Condition interaction, $F(1, 87) = 4.36$, $p = .04$. A simple effects analysis revealed significant gender differences occurring during the participant's introduction, $F(1,89) = 7.69$, $p < .01$, but not while the participant passively viewed the confederate, $F(1, 89) = .08$, $p = .05$. Specifically, while participants introduced themselves females displayed more positive facial expressions, $M = 7.17$, $SD = 4.42$, than males, $M = 4.74$, $SD = 3.67$.

Negative Facial Expressivity

For negative facial expression, there was also main effect of condition, $F(1, 89) = 35.11$, $p < .001$. Examination of marginal means showed that participants

displayed more negative affect while they responded to the confederate (M = 1.87, SD = .28) than when they passively viewed the confederate (M = .25, SD = .09). The group main effect, $F(1,89) = .31$, $p > .05$, and the Group × Condition interaction were nonsignificant, $F(1,89) = 1.16$, $p > .05$. Results examining the effect of gender did not differ from these results.

EMOTION EXPERIENCE

Positive Affect

Self-reported positive and negative affect in response to the social interaction were measured using the PANAS (see Table 7 for descriptive statistics). Change in positive affect scores across time points (pre- and post-social interaction) was assessed with a 2 (group: social anhedonia vs. control) × 2 (time: pre vs. post) repeated-measures ANOVA. There was a significant main effect of time, $F(1, 93) = 4.15$, $p = .045$, with marginal means showing that participants reported higher positive affect after the social interaction (M = 34.29, SD = 1.02) compared to baseline (M = 33.09, SD = .86) (see Figure 1). There was a significant main effect of group, $F(1, 93) = 5.01$, $p = .03$, which indicated that individuals elevated on social anhedonia reported less positive affect (M = 31.68, SD = 1.34) than controls (M = 35.70, SD = 1.19). There was no significant interaction effect between group and time, $F(1, 93) = 2.04$, $p > .05$. However, inspection of the means shows that change across time in controls (d = .24) may have driven the main effect of time, as individuals with social anhedonia did not appear to show changes in positive affect across time (d = .04). Thus, the lack of a statistically significant interaction may be a result of insufficient statistical power.

Because emotional experience may be influenced by the gender disparities in the current sample, analyses were repeated using a repeated measures ANOVA to test the possible effect and interaction of gender, group, and pre/post PANAS scores. Results showed no significant main effects of group nor gender, all p's > .05, and the Group × Gender interaction was not significant, $p > .05$.

Negative Affect

Next, negative affect was assessed using the same method described above (see Figure 2). A repeated-measures ANOVA determined a main effect of time approaching significance, $F(1, 93) = 3.96$, $p = .05$, with higher negative affect scores seeming to occur before the social interaction across both groups ($M = 17.01$, $SD = .45$) relative to mood scores after the social interaction ($M = 16.13$, $SD = 0.48$). There was no main effect of group, $F(1, 93) = 1.59$, $p > .05$, and there was no significant interaction between group and negative affect, $F(1, 93) = .05$, $p > .05$. Again, given gender disparities in the current sample, we repeated the analyses for negative affect using a repeated measures ANOVA. Results showed no significant main effects of group or gender, all p's > .05, and the Group × Gender interaction was not significant, $p > .05$.

Positive Reactions to Partner

To examine whether social anhedonia and control groups differed on self-reported positive reactions in response to their role-play partner (actor), an ANOVA was conducted with group as the independent variable and ratings of positive reactions to partner (PRP) as the dependent variable (see Table 8 for descriptive statistics). As predicted, results showed a significant effect of group on positive

reactions to the confederate, $F(1, 94) = 5.91$, $p = .02$, $d = .50$, with individuals elevated on social anhedonia reporting fewer positive and affiliative reactions toward their role play partner compared to controls. Results indicated that individuals with social anhedonia viewed the confederate as less pleasant than controls. Results were repeated to examine the effect of gender, but there was no significant main effect of gender nor a significant Group × Gender interaction, all p's $> .05$.

Willingness to Interact with Partner

To examine whether individuals with social anhedonia would be less willing to interact with their partner in future social situations as compared to controls, a one-way ANOVA was conducted with group as the independent variable and ratings of willingness to interact as the dependent variable (see Table 8 for descriptive statistics). As expected, the social anhedonia group reported less willingness to interact with their partner compared to controls, $F(1, 94) = 10.50$, $p < .005$, $d = .65$. Thus, individuals with social anhedonia were less willing to engage in a variety of social interactions and situations with the confederate compared to controls. Finally, results were repeated to examine the effect of gender, but there was no main effect of gender nor a significant Group × Gender interaction, all p's $> .05$.

CORRELATIONS BETWEEN SOCIAL BEHAVIORS AND EMOTIONAL RESPONSES

A series of correlations were conducted to determine the relationship among dependent variables in the social anhedonia group. First, intercorrelations among emotion experience (PANAS, PRP, WILL), emotion expression (FACES), and social

skill variables were examined. Next, the relationship between these variables and social functioning (SAS-SR and SSQ) was examined.

Bivariate correlations were performed to examine the relationship between indices of social behaviors (social skill) and emotional responses (FACES, PANAS, PRP, WILL) during the simulated social interaction in the social anhedonia group. As seen in Table 9, all social skills variables were highly and positively correlated with each other, all *p's* < .05. Significant positive correlations emerged between social skill ratings of nonverbal content, affiliation and overall social skill and all variables tapping into positive emotional responses to the social interaction (FACES, PANAS, PRP, WILL), all *p's* < .05, however verbal ratings of social skill were not significantly related to emotion experience nor expression variables, all *p's* > .05. Although observer rated facial expression during the social interaction was positively correlated with social skill ratings (nonverbal, affiliation and overall), all *p's* < .05, facial expressivity was not significantly associated with self-reported positive affect assessed by the PANAS, or positive reactions toward the confederate (PRP, WILL).

In terms of self-reported positive affect in response to the social interaction, positive affect (PANAS) was positively correlated with self-reported positive reactions toward the confederate and their willingness to interact with the confederate in the future, all *p's* < .05, indicating that individuals with social anhedonia's mood in response to the social interaction was congruent with their likeability ratings towards the confederate. In summary, these results indicate that participants' emotional reactions and responses to the social interaction are related to ratings of social skill,

specifically involving their affiliation towards the confederate and their nonverbal and overall social skill.

Second, the relationship between social functioning and indices of social behaviors (social skill) and emotional responses (FACES, PANAS, PRP, WILL) were examined (see Table 9). As observed in the literature, correlations between social functioning and social support measures were significant among individuals elevated on social anhedonia, all *p's* < .05. However, a different pattern emerged when examining the relationship between social functioning variables and social skill; the only significant correlation that emerged was between the number of individuals that a person could rely on (SSQ number) and the social skill component of verbal content, $p < .01$. Results indicate that for individuals with social anhedonia, the reported number of people they can depend on is related to how observers rated the participants' ability to introduce themselves appropriately to the confederate, describe their friends and family, and describe their hobbies and interests.

Focusing on emotion experience and expression, neither frequency of facial expression nor self-reported positive affect in response to the social interaction were associated with social functioning and social support variables, all *p's* > .05. Furthermore, scores on the WILL and PRP scales were not related to measures of social functioning and social support, all *p's* > .05. Results from the current study indicated that observer-rated emotion expression and self-reported internal emotion experience during the social interaction were not related to self-reported social functioning and social support.

MANIPULATION CHECK

The simulated live social interaction developed specifically for the current study has never been used to elicit emotion. Examination of the Post-Experimental Inquiry (PEI) was used to identify whether participant behaviors were affected by a suspicion of deception rather than a natural response to the manipulation. Experimenters coded three possible responses; (1) not aware of deception, (2) fully aware of deception, and (3) somewhat aware of deception. To dichotomize responses, the current study divided the sample into participants who were suspicious of deception and those who did not suspect any deception. This approach has been recommended as a way to check for the effect of knowledge of deception on participant responses (Breakwell, 2004). Chi square analyses revealed that 52% of participants were suspicious of deception in the current study. Specifically, 59.5% of participants in the social anhedonia group suspected deception in the study, and 46.3% of controls believed that the current study involved deception. There were no significant differences between groups on beliefs about the current study's deception, χ^2 (1) = 1.66, which implies that knowledge about deception did not contribute to the obtained group results.

POST HOC EXPLORATORY ANALYSIS

Depression

Given group disparities in depression scores, post-hoc analyses were performed to determine if individuals without clinically significant depression scores differed from the entire sample on the dependent variables. Based on the BDI-II cut-off score guidelines (Beck, Steer, & Brown, 1996), all analyses investigating group

differences were repeated excluding participants scoring above the threshold for mild depression (a score of 14 and above). The new data set included 31 individuals with social anhedonia and 47 controls. There were no significant differences on BDI-II scores ($t(76) = 1.72$, $p = .09$) after removing these individuals from the sample. Mean BDI scores were $M = 7.77$ ($SD = 3.65$) for individuals with social anhedonia and $M = 6.49$ ($SD = 2.92$) for controls. The same pattern of effects emerged for group differences on SPQ scores except there was no significant group difference for constricted affect, $F(1, 70) = 3.29$, $p = .07$, although it approached significance. Similar to results including the entire sample, there were significant effects of group on social functioning, social support, reactions to role-play partner, and willingness to interact with the confederate in the future, with individuals with social anhedonia demonstrating impaired social functioning and less positive reactions to the confederate compared to controls, all p's $< .05$. However, unlike the entire sample, groups did not significantly differ on ratings of affiliative social skills, $F(1, 73) = 2.41$, $p > .05$, or overall social skill, $F(1, 73) = 2.85$, $p > .05$.

CHAPTER 5: DISCUSSION

This study sought to examine whether individuals elevated on social anhedonia would be characterized by deficits in social skill and emotional responding during a social affiliative interaction compared to normally hedonic controls. The current study extends prior laboratory research with the use of a novel simulated social interaction intended to capture aspects of affiliative behavior. Additionally, it is the first study to concurrently examine the relationship between social behaviors and emotional responding within social anhedonia.

As hypothesized, the current study found that individuals with social anhedonia reported fewer social supports and poorer social functioning as compared to controls. Namely, individuals with social anhedonia reported fewer people they can depend on for social support and less satisfaction with their number of social supports. This finding is consistent with research illustrating that individuals elevated on social anhedonia report having fewer people they can depend on for social support (Blanchard & Brown, 1999; Blanchard et al., in press; Horan et al., 2007). Interestingly, individuals with social anhedonia reported less satisfaction with the number of people they can depend on despite research demonstrating that individuals with social anhedonia prefer to be alone (e.g., Brown et al., 2007). As previously suggested, it may be that individuals with social anhedonia may experience their social environments with disinterest and disengagement while also being aware of, and possibly displeased with, their lack of social support (Blanchard et al., in press).

Additionally, individuals with social anhedonia differed from their normal hedonic counterparts in their self-reported social functioning, consistent with previous research reporting that social functioning deficits are present in non-clinical individuals elevated on social anhedonia (Blanchard et al., in press; Diaz et al., 2002, Kwapil, 1998). These findings are important because poor social adjustment prior to the onset of schizophrenia is a robust predictor of more adverse long-term outcomes (Hafner et al., 1999, Paillere-Martinot et al., 2000). Furthermore, social problems may predate the clinical onset of schizophrenia-spectrum disorders suggesting that social functioning problems associated with schizophrenia are unlikely to be explained solely by the symptoms of the disorder or by the effects of medication.

With regard to participant social behaviors during the simulated social interaction, participants with social anhedonia were rated as demonstrating poorer social skill compared to controls. Specifically, individuals with social anhedonia obtained lower ratings in the social skill domains of affiliation, or the extent to which participants demonstrated engagement and involvement in the interaction with the confederate, and overall social skill, or the participant's general social competence. These findings are consistent with studies of college students in which high anhedonia was related to various indices of decreased social competence (Haberman et al. 1979; Chapman et al. 1980; Numbers and Chapman 1982; Beckfield, 1985), however the methodology of these studies differed from the current study in that participants were high on physical anhedonia and these studies used role-play responses to problematic academic and interpersonal relationships to measure social competence.

Another study by Collins et al. (2005) used the IM-SS Schizodia Scale to examine the behavioral characteristics of individuals elevated on social anhedonia and found that these individuals displayed deficits in non-verbal expression and verbal expression. Even though the current study found no significant differences between groups on verbal and non-verbal expression, effect sizes for these domains (d = .37 and d = .36 respectively) were in the small to medium range indicating possible less pronounced deficits for individuals with social anhedonia. Furthermore, individuals with social anhedonia received lower ratings of affiliation and overall social skill compared to controls, and these integrative categories include verbal and non-verbal behaviors. It is also important to note that the current study used a direct

measure of social skill as opposed to the broad behavioral ratings utilized by Collins and colleagues (2005).

Another study aim sought to examine emotional responding to the simulated social interaction. The current findings demonstrated that individuals with social anhedonia and controls displayed comparable facial expressions while viewing the confederate's introduction and while responding to the confederate. This observation is inconsistent with previous research finding that non-clinical individuals elevated on social anhedonia are less facially expressive than controls in response to emotionally evocative film clips (Leung et al., 2010). Interestingly, results showed that all participants displayed more positive and negative facial affect while they responded to the participant, which involved active communication, as opposed to passively viewing the confederate. It may be that individuals with social anhedonia can facially express emotions equally as frequent as controls in emotionally arousing situations. Another possible explanation is that individuals with social anhedonia may understand social norms and produce socially appropriate levels of expressivity in response to a social situation in which they know they are being monitored. With regard to gender differences, females displayed more positive facial expression than males while they introduced themselves to the confederate. This result is consistent with research stating that females display more positive facial affect than males in social situations, especially with female interaction partners (Kring & Gordon, 1998).

With regard to emotional experience, results indicate that individuals elevated on social anhedonia reported less positive emotions in response to the social interaction in general, but individuals with social anhedonia did not appear to change

in positive affect across time. This is evidenced by the small effect size for the relationship between pre- and post-positive affect in the social anhedonia group (d = .04). This finding implies that individuals with social anhedonia may not have been emotionally affected by the social interaction, instead their baseline level of positive affect was initially lower than that of controls and remained constant following the social interaction. The current study's findings are consistent with a study by Kerns et al. (2008) reporting that decreased positive affect intensity in social anhedonia occurs across a variety of settings, such as lab stimuli, during social interactions, and even when alone. Additionally, the social anhedonia group's lower levels of positive affect upon arrival to the laboratory may provide further support for the notion that social anhedonia is characterized by low levels of trait positive affect. In terms of negative affectivity, results demonstrated no group differences in negative affect in response to the social interaction. This finding is incongruent with reported findings of higher negative affect in individuals with social anhedonia compared to controls (Blanchard et al., in press; Gooding & Tallent, 2003). However, the current study's findings are consistent with a study demonstrating that individuals with social anhedonia show normal levels of negative affect for lab stimuli (Kerns et al., 2008). In general, results are compatible with previous reports that individuals elevated on social anhedonia are more likely to be low in positive affect but not high in negative affect (Brown et al., 2007, 2008; Kerns et al., 2008; Kwapil et al., 2006).

In terms of affiliative reactions, individuals with social anhedonia reported less positive reactions toward the confederate and less willingness to interact with the confederate in the future compared to controls. These findings were expected based

on the conceptualization of social anhedonia as the diminished capacity to experience pleasure or reward from social affiliation. Furthermore, this finding is compatible with research finding links between social anhedonia and avoidant attachment (Troisi, Alcini, Coviello, Nanni, Siracusano, 2010) such that individuals elevated on social anhedonia score high on dimensions of avoidant attachment, specifically discomfort with closeness. Avoidant people steer clear of intimate social exchanges that may facilitate attachment formation (Bartholomew, 1990; Fraley et al., 1998). According to this theory, individuals with social anhedonia may have reported less affiliative reactions (e.g., trust, warmth, caring, interest) towards the confederate and less willingness to engage with the confederate in a variety of social situations (e.g., going to the movies, three hour trip, social event, becoming friends) because of an inherent disposition to avoid affiliative situations.

An alternative explanation may be that for individuals with social anhedonia the broad array of affiliative behaviors displayed by the confederate did not elicit incentive-motivated approach to the affiliative goal of future social interactions. Furthermore, the finding that participants with social anhedonia reported less positive reactions toward the confederate may indicate that proximal affiliative stimuli emanating from the interaction with the affiliative object (in this case, the confederate) did not elicit strong feelings of consummatory reward. This is consistent with Depue's (2006) theory that in normally hedonic individuals, affiliative bonds are maintained across two phases of reward, namely appetitive and consummatory processes. Deficits in these two processes may characterize non-clinical individuals with social anhedonia. It is evident that more research is needed to clarify the role of

motivational processes and affiliative reward with regard to the experiential reactions of individuals elevated on social anhedonia.

Next, this study examined associations between indices of social behaviors (social skill) and emotional responses (FACES, PANAS, PRP, WILL) in the social anhedonia group. Social behaviors, as measured by social skill variables, were associated with emotional responses, and this demonstrates that social skill together with emotional responses during social interactions may contribute to the social deficits seen in individuals elevated on social anhedonia. However, examination of the association between these variables and social functioning measures revealed a significant correlation only between the number of individuals a person can rely on for social support and the social skill component of verbal content. Social functioning was not associated with any other social behaviors or emotional responses. This finding is surprising given that a number of studies have noted positive correlations between positive affect, self-reported adaptive responding, and the quality and quantity of social engagement (Berry, Willingham, & Thayer, 2000; Berry & Hansen, 1996; Watson, Clark, McIntyre, & Hamaker, 1992). The current study's nonsignificant findings may be attributed to the restricted range of general functioning in the current college sample.

Correlations also revealed that all emotional experience measures were correlated with each other and this makes intuitive sense given that emotional reactions in response to the social interaction are conceptually related; in this case positive affect toward the interaction, likeability toward the confederate, and

willingness to engage in future social interactions with the confederate. Similarly, social functioning and social support measures were related to each other.

The results of the current study have theoretical implications for understanding social anhedonia. First, the current study provides some evidence that individuals who are at putative risk for schizophrenia-spectrum disorders may not display the same pattern of deficits evidenced in individuals who have already decompensated into schizophrenia-spectrum disorders. In the current study, individuals with social anhedonia did not show deficits in facial expressivity, but they demonstrated a deficit in positive affect in response to the social interaction. This pattern is different from research on individuals with schizophrenia that report deficits in facial expressivity and describe greater or similar levels of positive and negative affect as compared to controls (Earnst & Kring, 1999; Kring et al., 1996).

In addition, the current study provided a new paradigm for investigating the social behaviors and emotional reactions of individuals elevated on social anhedonia. It is recommended that research in the area of social anhedonia and social interactions develop and utilize externally valid stimuli to better elicit social behaviors and emotional reactions. It is clear from the results of the current study that the simulated social interaction produced significant changes in participants' mood and facial affect, such that the affiliative interaction produced higher positive affect as intended. Efforts to understand the social behaviors of individuals elevated on social anhedonia would benefit from using social evocative stimuli. Furthermore, this social interaction paradigm may be refined for use in clinical populations.

Lastly, the findings of this study in context with previous research have significant implications for early identification and intervention. Social anhedonia has been regarded as a reliable risk factor for schizophrenia-spectrum disorders. If future studies continue to confirm social anhedonia as a mechanism of psychopathological dysfunction, it may become the target of future preventive treatment. Currently, the occurrence of social and emotional deficits alone cannot predict such a low base rate disorder without incurring substantial false positives. Prediction could perhaps be improved by screening for social and emotional deficits in combination with other sensitive predictors of schizophrenia. Although social anhedonia is not a specific enough indicator of schizophrenia, psychosocial interventions are relatively low risk and may offer a number of important benefits for individuals identified as at risk for schizophrenia-spectrum disorders (Gleeson, Larsen, & McGorry, 2003).

Limitations

As with all studies, this study had several limitations. First, this study only utilized a female actress for the social stimulus even though both male and female participants were chosen for the study, thus the effects of same sex and opposite sex interactions could not be examined. Nevertheless, a female confederate was chosen as opposed to a male confederate given research suggesting that women report greater self-disclosure (Cozby, 1973), friendliness, empathy, altruism (Gibbs, Auerbach, & Fox, 1980), and interpersonal affection (Aries, 1976) within same-sex friendships. In addition, data suggests that males are more concerned with self-presentation, and are more likely to exhibit warmth and agreeableness during opposite sex interactions (Alden, Teschluk, & Tee, 1992; Cunnningham, Druen, & Barbee, 1997; Leary et al.,

1994; Robins, 1987). Despite this, the development and inclusion of a male videotape would have been more informative, especially in terms of examining gender differences in emotional responding based on interaction partner gender.

Secondly, results of the present study are limited in their generalizability. There were a greater number of females than males in the social anhedonia group, and this may have prevented the detection of true effects. Despite efforts to match participants on gender, the low base rate of males elevated on social anhedonia made it difficult to recruit males with social anhedonia. In addition, like previous studies in this area, this study relied on a college student sample and therefore imposed limitations on the generalizability of findings with regard to participants' restricted range of age, socioeconomic status, education, and general level of functioning. For example, individuals attending college are less likely to develop psychiatric disorders than those who do not (Newman, Moffitt, Caspi, & Silva, 1998). Despite these limitations in using an undergraduate sample, this sample allowed for the identification of individuals who are near the typical age of onset for schizophrenia and spectrum disorders (Wessely, Der, & Murray, 1991). For example, a study by Baron, Gruen, Asris, & Kane (1983) found that 55% of people affected with schizophrenia or schizotypy (in their sample) were affected before the age of 20. Thus, undergraduate students are at the age of risk for these disorders, in which social anhedonia plays a key role.

Additionally, relating social anhedonia to schizotypy using the current sample may have limited the generalizability of findings. Unlike studies reporting that individuals with social anhedonia exhibit elevations on schizotypal traits related to

perceptual anomalies and unusual beliefs (e.g., Blanchard, Aghveli, Wilson, & Sargeant, 2010; Horan et al., 2007; Kwapil et al., 2002), the current study found that individuals with social anhedonia were only elevated on traits pertaining to the social domain of schizotypal personality characteristics. It may be that individuals with social anhedonia in this sample did not demonstrate clinical characteristics consistent with the risk for schizophrenia-spectrum disorders.

Finally, groups were found to differ on depression scores. Although depression is present in and tends to precede the schizophrenia prodome (Birchwood & Iqbal, 1998; Garety et al., 2001; Owens, Miller, Lawrie, & Johnstone, 2005), results may imply that the current sample of individuals with social anhedonia may have consisted of "false-positive" putative schizotypes who reported elevated social anhedonia because of state-like elevations in mood, rather than the trait-like social pleasure deficit that is presumed to underlie schizophrenia-spectrum disorders (Meehl, 1969). This concern is compounded by the fact that trait positive and negative affect measures where not collected in the present study. To address this, the current study repeated all analyses excluding participants scoring above the BDI-II threshold for mild depression. All results remained the same except that groups did not differ on social skill measures. This implies that individuals with social anhedonia with depressive symptoms were rated as having more deficits in social behaviors, however it is interesting that depression scores did not impact emotional responses as would be expected.

Directions for Future Research

Future research should build on the present findings in several ways. The current study provided examination of the emotional responses and social behaviors of individuals at putative risk for developing schizophrenia-spectrum disorders. This study demonstrated that individuals elevated on social anhedonia were rated as less socially skilled than normally hedonic controls and report enjoying social interactions and liking their social partner less than controls. However, this study failed to find support for decreased facial expressions in response to the social interaction. Future research should seek to determine generalizability of these effects with respect to investigating individuals in the community.

Future studies would also benefit from conducting studies that establish the reliability and validity of the simulated social interaction stimulus developed for this study. Also, developing a film clip with a male confederate would allow for a better understanding of the gender differences in emotional and behavioral responding in social situations. Furthermore, future studies should develop and evaluate a range of social interactions to determine participant reactions across confederate sociability. Finally, given the degree of suspiciousness surrounding the stimulus, future studies should refine the simulated social interaction to increase its credibility with participants.

Examining whether individuals with social anhedonia generate consistent and reliable reactions from peers via social competency and likability ratings could extend the current study. Moreover, peer ratings could more accurately reflect participants' social functioning by determining whether others will view participants favorably and decide to pursue social relationships following interactions. Similar paradigms have

been utilized in studies investigating interpersonal perceptions of people with personality disorder features (e.g., South et al., 2005). Research in this area is necessary for understanding how the social behaviors (such as poor social skill) of individuals with social anhedonia affect how they are viewed by peers and whether unfavorable interpersonal perceptions hinder social anhedonics from acquiring people they can depend on for social support. This is important given the role of social contact as a protective factor against psychopathology (Leff, 1996; MacKain, Liberman, & Corrigan, 1994).

Another area for future research involves conducting longitudinal studies that follow the trajectories of individuals with social anhedonia to examine the course of their social and emotional deficits and to determine which individuals elevated on social anhedonia decompensate into schizophrenia-spectrum disorders. Finally, research focusing on at-risk individuals should examine the biological and physiological correlates of emotional responding and social dysfunction in response social interactions.

Conclusions

This study has demonstrated that individuals with social anhedonia are characterized by poorer social functioning and less social support from others compared to normally hedonic controls. In terms of participant behavior during the simulated social interaction, individuals with social anhedonia were rated as less socially skilled, specifically in affiliative social behaviors and overall social skill, as compared to controls. Individuals with social anhedonia did not differ from controls on observer-rated frequency of facial expression during the simulated social

interaction. At baseline, individuals with social anhedonia reported lower state positive affect that remained relatively constant even after the social interaction. On the contrary, individuals with social anhedonia did not differ from controls on state negative affect. In response to their interaction partner, individuals with social anhedonia reported less affiliative and pleasant reactions toward the confederate and less willingness to interact socially with the confederate in the future. These results converge with prior findings in that individuals with social anhedonia may experience less positive and affiliative reactions in response to social interactions. Despite deficits in emotional and behavioral responding during the social interaction, these socially impairing factors were not associated with social functioning measures. In general, this study provides a better understanding of the affective and behavioral reactions associated with social anhedonia, specifically during social interactions. Further, this study provides empirical support for the idea that emotional responding and social behaviors in individuals at putative risk for developing schizophrenia-spectrum disorders may differ from those who have already developed the illness. Notably, results of the current study also demonstrate that the simulated live social interaction developed for the current study may better elicit social affiliative behaviors and experiences than previous stimuli, and may help clarify the affective components of social anhedonia. Future research should consider implementing externally valid stimuli, such as the stimulus utilized in this study, and should focus on recruiting participants from a diverse community sample. While there are several limitations to the current study, this study provides the basis for future research on the

social behaviors and emotional characteristics of individuals at-risk for schizophrenia-spectrum disorders.

Tables

Table 1

Demographic Information on Individuals Elevated on Social Anhedonia and Controls

Demographics	Social Anhedonia (n = 42) *M (SD)*	Controls (n = 54) *M (SD)*
Age (in years)	20.05 (2.55)	19.59 (1.24)
	% (n)	% (n)
Gender (%)		
Female	76.20 (32)	51.90 (28)
Race (%)		
White	59.50 (25)	63.00 (34)
Black	23.80 (10)	14.80 (8)
Hispanic	4.80 (2)	1.900 (1)
Asian	9.50 (4)	13.00 (7)
Multi-racial	2.40 (1)	7.40 (4)

Table 2

Descriptive Statistics of Self-report Participant Characteristics for Individuals Elevated on Social Anhedonia and Controls

Variable	Social Anhedonia	Control	
	M (SD)	*M (SD)*	*F*
BDI-II	10.71 (6.34)	8.06 (5.19)	**5.10***
SPQ			**5.42****
Ideas of Reference	3.50 (2.50)	3.75 (2.08)	.28
Social Anxiety	4.87 (2.41)	3.30 (2.19)	**11.02****
Odd Beliefs	0.95 (1.71)	1.09 (1.39)	.18
Perceptual Experiences	2.33 (1.93)	2.41 (1.87)	.04
Eccentric Behavior	3.36 (2.34)	2.67 (1.99)	2.42
No Friends	4.31 (216)	1.68 (1.72)	**44.23****
Odd Speech	4.43 (2.70)	3.64 (2.03)	2.68
Constricted Affect	2.69 (1.66)	1.65 (1.60)	**9.64****
Suspiciousness	3.81 (2.14)	2.61 (2.00)	**7.99***
SPQ Total	30.25 (11.42)	22.80 (10.20)	**11.34****

Note. BDI-II = Beck Depression Inventory-II; SPQ = Schizotypal Personality Questionnaire.
* $p < .05$. ** $p < .01$.

Table 3

Descriptive Statistics for Social Support and Social Functioning for Individuals Elevated on Social Anhedonia and Controls

Measure	Social Anhedonia	Control	
	M (SD)	*M (SD)*	*F*
Social Adjustment Scale	106.52 (9.17)	113.46 (7.71)	**16.17***
Social Support Questionnaire			
Number of Social Supports	4.09 (1.85)	5.32 (1.79)	**10.87***
Satisfaction with Social Supports	5.04 (0.77)	5.53 (0.66)	**11.07***

*$p < .01$.

Table 4

Descriptive Statistics for Social Skill in Individuals Elevated on Social Anhedonia and Controls

	Social Anhedonia	Control		
Variable	*M (SD)*	*M (SD)*	*F*	Cohen's *d*
Verbal Content	3.96 (0.95)	4.28 (0.78)	3.26	0.37
Non Verbal Content	3.65 (1.17)	4.02 (0.84)	3.13	0.36
Affiliation	3.40 (1.25)	3.94 (0.89)	**6.04***	0.50
Overall Social Skill	3.63 (1.09)	4.06 (0.84)	**4.70***	0.44

Note. * $p < .05$. ** $p < .01$.

Table 5

Descriptive Statistics for FACES Variables in Individuals Elevated on Social Anhedonia and Controls

	Social Anhedonia	Control
Condition	*M (SD)*	*M (SD)*
Viewing Confederate's Introduction		
Positive Expression		
Frequency	2.97 (3.93)	3.59 (5.02)
Mean Intensity	.70 (.62)	.83 (.49)
Mean Duration	9.38 (17.16)	10.65 (13.47)
Negative Expression		
Frequency	.18 (.98)	.31 (.72)
Mean Intensity	.09 (.30)	.21 (.43)
Mean Duration	1.00 (5.13)	.65 (1.60)
Participant's Response		
Positive Expression		
Frequency	6.14 (4.66)	6.27 (4.04)
Mean Intensity	1.19 (.28)	1.11 (.46)
Mean Duration	21.71 (21.34)	25.86 (24.45)
Negative Expression		
Frequency	2.08 (2.63)	1.66 (2.65)
Mean Intensity	.74 (.58)	.65 (.58)
Mean Duration	3.05 (4.44)	2.92 (6.27)

Note. FACES = Facial Affect Coding System.

Table 6

Intercorrelations of FACES Variables in Social Anhedonia (below the diagonal) and Controls (above the diagonal)

	Positive expressions			Negative expressions		
Rated dimension	*1*	*2*	*3*	*1*	*2*	*3*
			Viewing Confederate's Introduction			
1. Frequency	--	.50**	.70**	**--**	.89**	.86**
2. Mean Intensity	**.70****	--	.63**	**.74****	**--**	.86**
3. Mean Duration	**.89****	**.54****	--	**.99****	**.77****	--
			Participant's Response			
1. Frequency	**--**	.68**	.71**	**--**	.71**	.84**
2. Mean Intensity	**.37***	**--**	.61**	**.59****	**--**	.58**
3. Mean Duration	**.56****	**.72****	**--**	**.95****	**.56****	**--**

Note. FACES = Facial Expression Coding System. Correlations in bold type are for the social anhedonia group; correlations in normal-type are for control participants. *$p < .01$. *$p < .05$.

Table 7

Descriptive Statistics for PANAS Scores for Individuals Elevated on Social Anhedonia and Controls

	Social Anhedonia	Control
Time	*M (SD)*	*M (SD)*
Pre-Social Interaction		
Positive Affect	31.50 (8.53)	34.68 (8.20)
Negative Affect	17.48 (4.42)	16.55 (4.28)
Post-Social Interaction		
Positive Affect	31.86 (10.18)	36.85 (9.60)
Negative Affect	16.69 (5.13)	15.57 (4.19)

Note. PANAS = Positive and Negative Affect Schedule.

Table 8

Descriptive Statistics for Positive Reactions to Partner (PRP) and Willingness to Interact (WILL) for Individuals Elevated on Social Anhedonia and Controls

	SocAnh	Control		
Measure	*M (SD)*	*M (SD)*	*F*	Cohen's *d*
PRP	24.83 (4.59)	27.24 (4.98)	**5.91****	0.50
WILL	18.57 (4.96)	21.82 (4.99)	**10.50***	0.65

*$p < .05$. **$p < .01$.

Table 9

Summary of Intercorrelations for Self-Reported Positive Affect and Observer Ratings of Facial Expression and Social Skill for the Social Anhedonia Group

Measure	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*
1. PANAS - PA	--										
2. SS - Verbal	.18	--									
3. SS -Nonverbal	.50**	.55**	--								
4. SS - Affiliation	.42**	.70**	.84**	--							
5. SS - Overall	.46**	.72**	.89**	.94**	--						
6. FACES Positive Frequency	.11	.22	.49**	.46**	.41**	--					
7. PRP	.69**	.31	.40*	.41**	.43**	-.13	--				
8. WILL	.65**	.25	.38*	.33*	.36*	.20	.59**	--			
9. SAS-SR	.11	.20	.13	.18	.16	.14	.08	.27	--		
10. SSQ-N	.12	.49**	.15	.22	.27	.12	.12	.19	.36*	--	
11. SSQ-S	.12	.29	.11	.21	.17	-.06	.23	.20	.53**	.52**	--

Note. PANAS = Positive and Negative Affect Schedule; FACES = Facial Affect Coding System; SS = Social Skill; PRP = Positive Reactions to Partner; WILL = Willingness to Interact; SAS-SR = Social Adjustment Scale; SSQ-N= Social Support Questionnaire – Number; SSQ-S = Social Support Questionnaire - Satisfaction. PANAS score is based on positive affect (PA) post-interaction scores. FACES Positive Frequency is based on frequency scores while the participant responds to the confederate.

**$p < .01$. *$p < .05$.

Figure 1

Self-reported Positive Affect across Time Points in Social Anhedonics and Controls

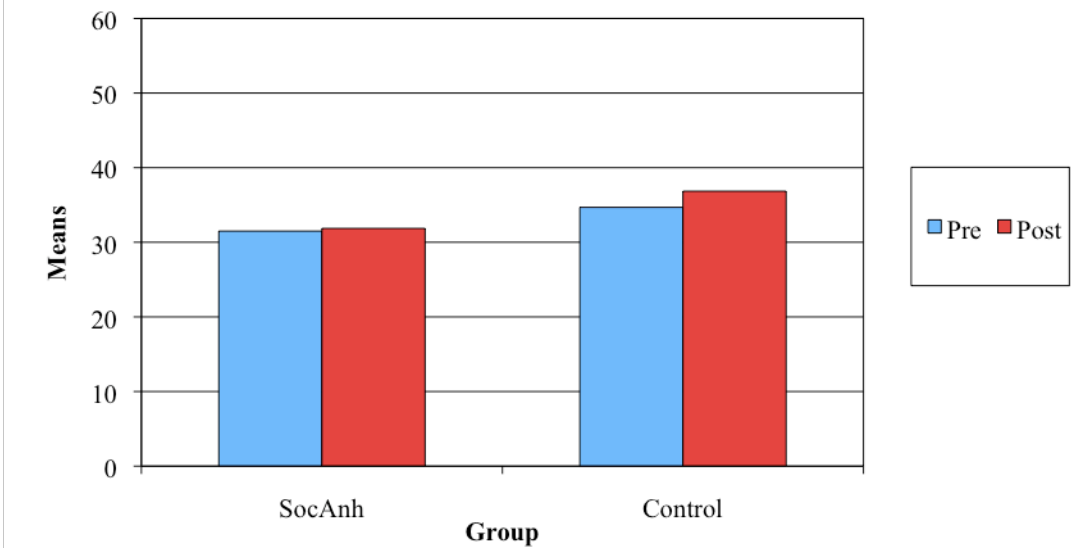
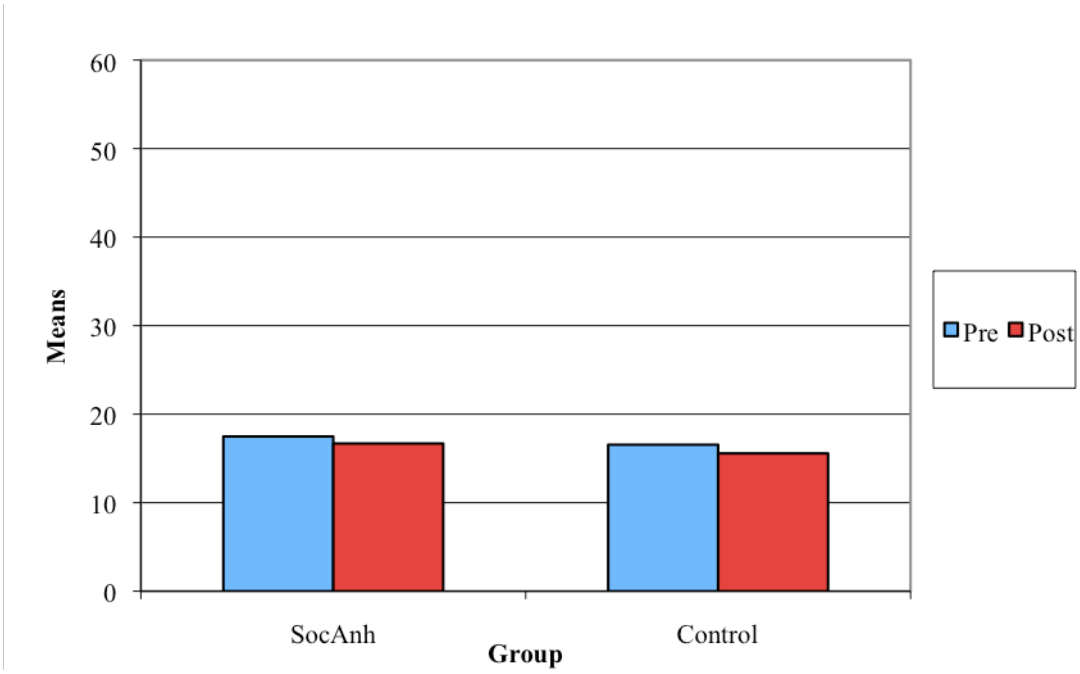


Figure 2

Self-reported Negative Affect across Time Points in Social Anhedonics and Controls



Appendices

Appendix A
Revised Social Anhedonia Scale

Instructions: For each of the following statements, please indicate whether the statement is true or false of you.

1. Having close friends is not as important as many people say.
2. I attach very little importance to having close friends.
3. I prefer watching television to going out with other people.
4. A car ride is much more enjoyable if someone is with me.
5. I like to make long distance phone calls to friends and relatives.
6. Playing with children is a real chore.
7. I have always enjoyed looking at photographs of friends.
8. Although there are things that I enjoy doing by myself, I usually seem to have more fun when I do things with other people.
9. I sometimes become deeply attached to people I spend a lot of time with.
10. People sometimes think that I am shy when I really just want to be left alone.
11. When things are going really good for my close friends, it makes me feel good too.
12. When someone close to me is depressed, it brings me down also.
13. My emotional responses seem very difference from those of other people.
14. When I am alone, I often resent people telephoning me or knocking at my door.
15. Just being with friends can make me feel really good.
16. When things are bothering me, I like to talk to other people about it.
17. I prefer hobbies and leisure activities that do not involve other people.
18. It's fun to sing with other people.
19. Knowing that I have friends who care about me gives me a sense of security.
20. When I move to a new city, I feel a strong need to make new friends.
21. People are usually better off if they stay aloof from emotional involvements with most others.
22. Although I know I should have affection for certain people, I don't really feel it.
23. People often expect me to spend more time talking with them than I would like.
24. I feel pleased and gratified as I learn more and more about the emotional life of my friends.
25. When others try to tell me about their problems and hangups, I usually listen with interest and attention.
26. I never had really close friends in high school.
27. I am usually content to just sit alone, thinking and daydreaming.
28. I'm much too independent to really get involved with other people.
29. There are few things more tiring than to have a long, personal discussion with someone.
30. It made me sad to see all my high school friends go their separate ways when high school was over.
31. I have often found it hard to resist talking to a good friend, even when I have other things to do.
32. Making new friends isn't worth the energy it takes.
33. There are things that are more important to me than privacy.
34. People who try to get to know me better usually give up after awhile.
35. I could be happy living all alone in a cabin in the woods or mountain
36. If given the choice, I would much rather be with others than be alone.
37. I find that people too often assume that their daily activities and opinions will be interesting to me.
38. I don't really feel very close to my friends.
39. My relationships with other people never get very intense.
40. In many ways, I prefer the company of pets to the company of people.

Appendix B

Infrequency Scale

1. One some mornings, I didn't get out of be immediately when I first woke up.
2. There have been a number of occasions when people I know have said hello to me.
3. There have been times when I have dialed a telephone number only to find the line was busy.
4. At times when I was ill or tired, I have felt like going to bed early.
5. On some occasions I have noticed that some other people are better dressed than myself.
6. Driving from New York to San Francisco is generally faster than flying between these cities.
7. I believe that most light bulbs are powered by electricity.
8. I go at least once every two years to visit either northern Scotland or some part of Scandinavia.
9. I cannot remember a time when I talked with someone who wore glasses.
10. Sometimes when walking down the sidewalk, I have seen children playing.
11. I have never combed my hair before going out in the morning.
12. I find that I often walk with a limp, which is the result of a skydiving accident.
13. I cannot remember a single occasion when I have ridden on a bus.

Appendix C

Schizotypal Personality Questionnaire

Please answer each item by checking Y (Yes) or N (No). Answer ***all*** items even if unsure of your answer. When you have finished, check over each one to make sure you have answered them.

1. Do you sometimes feel that things you see on the TV or read in the newspaper have a special meaning for you?
   - ❑ Yes
   - ❑ No
2. I sometimes avoid going to places where there will be many people because I will get anxious.
   - ❑ Yes
   - ❑ No
3. Have you had experiences with the supernatural?
   - ❑ Yes
   - ❑ No
4. Have you often mistaken objects or shadows for people, or noises for voices?
   - ❑ Yes
   - ❑ No
5. Other people see me as slightly eccentric (odd).
   - ❑ Yes
   - ❑ No
6. I have little interest in getting to know other people.
   - ❑ Yes
   - ❑ No
7. People sometimes find it hard to understand what I am saying.
   - ❑ Yes
   - ❑ No
8. People sometimes find me aloof and distant.
   - ❑ Yes
   - ❑ No
9. I am sure I am being talked about behind my back.
   - ❑ Yes
   - ❑ No
10. I am aware that people notice me when I go out for a meal or to see a film.
    - ❑ Yes
    - ❑ No
11. I get very nervous when I have to make polite conversation.
    - ❑ Yes
    - ❑ No
12. Do you believe in telepathy (mind-reading)?
    - ❑ Yes
    - ❑ No

13. Have you ever had the sense that some person or force is around you, even though you cannot see anyone?
    - ❑ Yes
    - ❑ No

14. People sometimes comment on my unusual mannerisms and habits.
    - ❑ Yes
    - ❑ No

15. I prefer to keep to myself.
    - ❑ Yes
    - ❑ No

16. I sometimes jump quickly from one topic to another when speaking.
    - ❑ Yes
    - ❑ No

17. I am not good at expressing my true feelings by the way I talk and look.
    - ❑ Yes
    - ❑ No

18. Do you often feel that other people have it in for you?
    - ❑ Yes
    - ❑ No

19. Do some people drop hints about you or say things with a double meaning?
    - ❑ Yes
    - ❑ No

20. Do you ever get nervous when someone is walking behind you?
    - ❑ Yes
    - ❑ No

21. Are you sometimes sure that other people can tell what you are thinking?
    - ❑ Yes
    - ❑ No

22. When you look at a person, or yourself in a mirror, have you ever seen the face change right before your eyes?
    - ❑ Yes
    - ❑ No

23. Sometimes other people think that I am a little strange.
    - ❑ Yes
    - ❑ No

24. I am mostly quiet when with other people.
    - ❑ Yes
    - ❑ No

25. I sometimes forget what I am trying to say.
    - ❑ Yes
    - ❑ No

26. I rarely laugh and smile.
    - ❑ Yes
    - ❑ No

27. Do you sometimes get concerned that friends or coworkers are not really loyal or trustworthy?
    - ❑ Yes
    - ❑ No

28. Have you ever noticed a common event or object that seemed to be a special sign for you?
    - ❑ Yes
    - ❑ No

29. I get anxious when meeting people for the first time.
    - ❑ Yes
    - ❑ No

30. Do you believe in clairvoyancy (psychic forces, fortune telling)?
    - ❑ Yes
    - ❑ No

31. I often hear a voice speaking my thoughts aloud.
    - ❑ Yes
    - ❑ No

32. Some people think I am a very bizarre person.
    - ❑ Yes
    - ❑ No

33. I find it hard to be emotionally close to other people.
    - ❑ Yes
    - ❑ No

34. I often ramble on too much when speaking.
    - ❑ Yes
    - ❑ No

35. My nonverbal communication (smiling and nodding during a conversation) is not very good.
    - ❑ Yes
    - ❑ No

36. I feel I have to be on my guard even with friends.
    - ❑ Yes
    - ❑ No

37. Do you sometimes see special meanings in advertisements, shop windows, or in the way things are arranged around you?
    - ❑ Yes
    - ❑ No

38. Do you often feel nervous when you are in a group of unfamiliar people?
    - ❑ Yes
    - ❑ No

39. Can other people feel your feelings when they are not there?
    - ❑ Yes
    - ❑ No

40. Have you ever seen things invisible to other people?
    - ❑ Yes
    - ❑ No

41. Do you feel that there is no one you are really close to outside your immediate family, or people you can confide in or talk to about personal problems?
    - ❑ Yes
    - ❑ No

42. Some people find me a bit vague and elusive during a conversation.
    - ❑ Yes
    - ❑ No

43. I am poor at returning social courtesies and gestures.
    - ❑ Yes
    - ❑ No

44. Do you often pick up hidden threats or put-downs from what people say or do?
    - ❑ Yes
    - ❑ No

45. When shopping do you get the feeling that other people are taking notice of you?
    - ❑ Yes
    - ❑ No

46. I feel very uncomfortable in social situations involving unfamiliar people.
    - ❑ Yes
    - ❑ No

47. Have you had experiences with astrology, seeing the future, UFOs, ESP, or a sixth sense?
    - ❑ Yes
    - ❑ No

48. Do everyday things seem unusually large or small?
    - ❑ Yes
    - ❑ No

49. Writing letters to friends is more trouble than it is worth.
    - ❑ Yes
    - ❑ No

50. I sometimes use words in unusual ways.
    - ❑ Yes
    - ❑ No

51. I tend to avoid eye contact when conversing with others.
    - ❑ Yes
    - ❑ No

52. Have you found that it is best not to let other people know too much about you?
    - ❑ Yes
    - ❑ No

53. When you see people talking to each other, do you often wonder if they are talking about you?
    - ❑ Yes
    - ❑ No

54. I would feel very anxious if I had to give a speech in front of a large group of people.
    - ❑ Yes
    - ❑ No

55. Have you ever felt that you are communicating with another person telepathically (by mind-reading)?
    - ❑ Yes
    - ❑ No

56. Does your sense of smell sometimes become unusually strong?
    - ❑ Yes
    - ❑ No

57. I tend to keep in the background on social occasions.
    - ❑ Yes
    - ❑ No

58. Do you tend to wander off the topic when having a conversation?
    - ❑ Yes
    - ❑ No

59. I often feel that others have it in for me.
    - ❑ Yes
    - ❑ No

60. Do you sometimes feel that other people are watching you?
    - ❑ Yes
    - ❑ No

61. Do you ever suddenly feel distracted by distant sounds that you are not normally aware of?
    - ❑ Yes
    - ❑ No

62. I attach little importance to having close friends.
    - ❑ Yes
    - ❑ No

63. Do you sometimes feel that people are talking about you?
    - ❑ Yes
    - ❑ No

64. Are your thoughts sometimes so strong that you can almost hear them?
    - ❑ Yes
    - ❑ No

65. Do you often have to keep an eye out to stop people from taking advantage of you?
    - ❑ Yes
    - ❑ No

66. Do you feel that you cannot get “close” to people?
    - ❑ Yes
    - ❑ No

67. I am an odd, unusual person.
    - ❑ Yes
    - ❑ No

68. I do not have an expressive and lively way of speaking.
    - ❑ Yes
    - ❑ No

69. I find it hard to communicate clearly what I want to say to people.
    - ❑ Yes
    - ❑ No

70. I have some eccentric (odd) habits.
    - ❑ Yes
    - ❑ No

71. I feel very uneasy talking to people I do not know well.
    - ❑ Yes
    - ❑ No

72. People occasionally comment that my conversation is confusing.
    - ❑ Yes
    - ❑ No

73. I tend to keep my feelings to myself.
    - ❑ Yes
    - ❑ No

74. People sometimes stare at me because of my odd appearance.
    - ❑ Yes
    - ❑ No

Appendix D

The Social Adjustment Scale - Self Report

1. What best describes your school program?
____ Full Time
____ 3/4 Time
____ Half Time

2. How many days of classes did you miss in the last 2 weeks?
___ No days missed
___ A few days missed
___ I missed about half the time
___ Missed more then half the time but did make at least one day
___ I did not go to classes at all
___ I was on vacation all of the last two weeks

3. Have you kept up with your class work in the last two weeks?
___ I did my work very well
___ I did my work but had some minor problems
___ I needed help with work and needed help about half the time
___ I did my work poorly most of the time
___ I did my work poorly all the time

4. During the last 2 weeks have you been ashamed of how you do your school work?
___ I never felt ashamed
___ Once or twice I felt a little ashamed
___ About half the time I felt ashamed
___I felt ashamed most of the time
___ I felt ashamed all of the time

5. Have you had any arguments with people at school in the last 2 weeks?
___ I had no arguments and got along very well
___ I usually got along well but had minor arguments
___ I had more than one argument
___ I had many arguments
___ I was constantly in arguments

6. Have you felt upset at school during the last 2 weeks?
___ I never felt upset
___ Once of twice I felt upset
___ Half the time I felt upset
___ I felt upset most of the time
___ I felt upset all of the time

7. Have you found your school work interesting these last 2 weeks?
___ My work was almost always interesting
___ Once of twice my work was not interesting
___ Half the time my work was uninteresting
___ Most of the time my work was uninteresting
___ My work was almost always uninteresting

8. How many friends have you seen or spoken to on the telephone in the last 2 weeks?
___ Nine or more friends
___ Five to eight friends
___ Two to four friends
___ One friend
___ No friends

9. Have you been able to talk about your feelings and problems with at least one friend during the last 2 weeks?

___ I can always talk about my innermost feelings
___ I usually can talk about my feelings
___ About half the time I felt able to talk about my feelings
___ I usually was not able to talk about my feelings
___ I was never able to talk about my feelings
___ Not applicable; I have no friends

10. How many times in the last 2 weeks have you gone out socially with other people? For example, visited friends, gone to movies, bowling, church, restaurants, and invited friends to your home?
___ More than 3 times
___ Three times
___ Twice
___ Once
___ None

11. How much time have you spent on hobbies or spare time interests during the last 2 weeks? For example, bowling, sewing, gardening, sports, reading?
___ I spent most of my spare time on hobbies almost every day
___ I spent some spare time on hobbies some of the days
___ I spent a little time on hobbies
___ I usually did not spend any time on hobbies but did watch TV
___ I did not spend any spare time on hobbies or watching TV

12. Have you had open arguments with your friends in the past 2 weeks?
___ I had no arguments and got along very well
___ I usually got along but had minor arguments
___ I had more than one argument
___ I had many arguments
___ I was constantly in arguments
___ Not applicable; I have no friends

13. If your feelings where hurt of offended by a friend in the past 2 weeks, how badly did you take it?
___ It did not affect me or it did not happen
___ I got over it in a few hours
___ I got over it in a few days
___ I got over it in a week
___ It will take me months to recover
___ Not applicable; I have no friends

14. Have you felt shy or uncomfortable with people in the last 2 weeks?
___ I always feel comfortable
___ Sometimes I feel uncomfortable but could relax after a while
___ About half the time I feel uncomfortable
___ I usually felt uncomfortable
___ I always feel uncomfortable
___ Not applicable; I was never with people

15. Have you felt lonely and wished for more friends during the last 2 weeks?
___ I have not felt lonely
___ I have felt lonely a few times
___ About half the time I felt lonely
___ I usually felt lonely
___ I always felt lonely and wished for more friends

16. Have felt bored in your spare time during the last 2 weeks?
___ I never felt bored
___ I usually did not feel bored
___ About half the time I felt bored
___ Most of the time I felt bored
___ I was constantly bored

17. How many times have you been with a date in the last 2 weeks?
___ More than 3 times
___ Three times
___ Twice
___ Once
___ None

18. Have you been interested in dating during the last 2 weeks? If you have not dated, would you have liked to?
___ I always interested in dating
___ Most of the time I was interested
___ About half the time I was interested
___ Most of the time I was not interested
___ I was completely uninterested

The following questions concern your parents and siblings
19. Have you been in contact with any of them in the last 2 weeks?
___ Yes, please go to question
___ No, please go to question

20. Have you had open arguments with your relatives in the past 2 weeks?
___ We always got along very well
___ We usually got along very well but had some minor arguments
___ I had more than one argument with at least one relative
___ I had many arguments
___ I was constantly in arguments

21. Have you been able to talk about your feelings and problems with at least one friend during the last 2 weeks?
___ I can always talk about my feelings with at least one relative
___ I usually can talk about my feelings
___ About half the time I felt able to talk about my feelings
___ I usually was not able to talk about my feelings
___ I was never able to talk about my feelings

22. Have you avoided contact with your relatives these last 2 weeks?
___ I have contacted relatives regularly
___ I have contacted a relative at least one
___ I have waited for my relatives to contact me
___ I avoided my relatives, but they contacted me
___ I have no contacts with my relatives

23. Did you depend on your relatives for help, advice, money, or friendship during the last 2 weeks?
___ I never need to depend on them
___ I usually did not need to depend on them
___ About half the time I needed to depend on them
___ Most of the time I depend on them
___ I depend completely on them

24. Have you wanted to do the opposite of what your relatives wanted in order to male them angry during the last 2 weeks?
___ I never wanted to oppose them
___ Once of twice I wanted to oppose them
___ About half the time I wanted to oppose them
___ Most of the time I wanted to oppose them
___ I always oppose them

25. Have you been worried about things happening to your relatives without good reason in the last 2 weeks?

___ I have not worried without reason
___ Once or twice I worried
___ About half the time I worried
___ Most of the time I worried
___ I have worried the entire time

26. During the last 2 weeks, have you been thinking that you let any of your relatives down or have been unfair to them at any time?
___ I did not feel that I let them down at all
___ I usually did not feel that I let them down
___ About half the time I felt that I let them down
___ Most of the time I have felt that I let them down
___ I always felt that I let them down

27. During the last 2 weeks have you been thinking that any of your relatives have let you down or have been unfair to you at any time?
___ I never felt that they let me down at all
___ I felt that they usually let me down
___ About half the time I felt that they let me down
___ I usually have felt that they let me down
___ I am very bitter that they let me down

Appendix E

Social Support Questionnaire

INSTRUCTIONS: The following questions ask about people in your environment who provide you with help or support. Each question has two parts. For the **first** part, list all the people you know, excluding yourself, whom you can count on for help or support in the manner described. Give the person's initials and their relationship to you (see example). Then, write in the box the number of people you have listed. Do not list more than one person next to each of the numbers beneath the question.

For the **second** part, fill in the bubble to the left of the statement that represents how satisfied you are with the overall support you have.

If you have had **no support** for a question, fill in the bubble for "no one," but still rate your level of satisfaction.

Do not list more than nine persons per question.

Please answer all the questions as best as you can. All your responses will be kept confidential.

EXAMPLE

Who do you know whom you can trust with information that could get you in trouble?

____ No one	1) T.M. (brother)	4) T.N. (father)	7)
	2) L.M. (friend)	5) L.M. (employer)	8)
	3) R. S. (friend)	6)	9)

How satisfied?

____ very satisfied ____ fairly satisfied ____ a little satisfied

____a little dissatisfied ____ fairly dissatisfied ____ very dissatisfied

1) Whom can you really count on to be dependable when you need help?

____ No one	1)	4)	7)
	2)	5)	8)
	3)	6)	9)

2) How satisfied?

____ very satisfied ____ fairly satisfied ____ a little satisfied

____a little dissatisfied ____ fairly dissatisfied ____ very dissatisfied

3) Whom can you really count on to help you feel more relaxed when you are under pressure or tense?

____ No one	1)	4)	7)
	2)	5)	8)
	3)	6)	9)

4) How satisfied?

____ very satisfied ____ fairly satisfied ____ a little satisfied

____a little dissatisfied ____ fairly dissatisfied ____ very dissatisfied

5) Who accepts you totally, including both your worst and your best points?

____ No one	1)	4)	7)
	2)	5)	8)
	3)	6)	9)

6) How satisfied?

____ very satisfied	____ fairly satisfied	____ a little satisfied
____a little dissatisfied	____ fairly dissatisfied	____ very dissatisfied

7) Whom can you really count on to care about you, regardless of what is happening to you?

____ No one	1)	4)	7)
	2)	5)	8)
	3)	6)	9)

8) How satisfied?

____ very satisfied	____ fairly satisfied	____ a little satisfied
____a little dissatisfied	____ fairly dissatisfied	____ very dissatisfied

9) Whom can you really count on to help you feel better when you are feeling generally down-in-the-dumps?

____ No one	1)	4)	7)
	2)	5)	8)
	3)	6)	9)

10) How satisfied?

____ very satisfied	____ fairly satisfied	____ a little satisfied
____a little dissatisfied	____ fairly dissatisfied	____ very dissatisfied

11) Whom can you count on to console you when you are very upset?

____ No one	1)	4)	7)
	2)	5)	8)
	3)	6)	9)

12) How satisfied?

____ very satisfied	____ fairly satisfied	____ a little satisfied
____a little dissatisfied	____ fairly dissatisfied	____ very dissatisfied

Appendix F

Social Skills Manual

Social Interactions Study

VERBAL/CONVERSATIONAL CONTENT

Conversational content refers to the actual content of the individual's speech. Think about *what* he/she said and not *how* he/she said it. Did the participant complete the task? In other words, based on what the participant said, did he/she introduce himself/herself to the other person? Did the participant talk about engaging in social sitations with friends and family?

1	2	3	4	5
Very poor	Poor	Neither good nor poor	Somewhat good	Very good

High Rating in Conversational Content

A high rating here would be given for someone who introduces himself/herself (e.g., gives name, where he/she is from, age, etc.); describes his/her family and friends; and talks about many of his/her interests, hobbies, and favorite activities with family and friends.

Low Rating in Conversational Content

A low rating for conversational content would be given for someone who does not complete the task of introducing himself/himself. Someone who does not say much about their friends and family or what they like to do in their free time would receive a low rating. Also, an individual who does not stay on task would receive a low rating (e.g., goes on a tangent about one of his/her classes or talks about the study). If, after the individual finishes, and you think to yourself, «I still don't know much about this person or what they like to do with their friends and family,» then he/she would receive a low rating. The participant may say things that are improper and would make you feel uncomfortable. He/she may share excessively personal information, ask inappropriate questions, or talk about negative aspects the entire time (e.g. “I really don't like going out with people. I rather stay home by myself. I don't like meeting new people”). This rating should be distinct from word frequency/duration. Someone can talk a lot but still not say appropriate, task-relevant things.

WORD COUNT

Record the frequency of the total number of words used by the participant throughout the role play.

DURATION OF INTERACTION

Record for how long the participant speaks

NON-VERBAL CONTENT

This is a measure how the subject speaks, not what she says. The paralinguistic aspects of speech (e.g., voice tone, volume, pace, inflection) and non-verbal behaviors/social reinforcers (facial expression, gestures, posture) should be included. The range and appropriateness of the subject's feeling tone or affective expression during the social interaction are reflected in this category. Subject should have good clarity, speak fluently, and maintain a smooth flow to his/her speech. Speech is clear, well articulated, continuous, and facile. Appropriateness of gaze should also be considered. An important thing to remember here is that most people do not make constant eye contact, and that it may even be considered abnormal to do so. Natural gaze patterns involve periodic shifts in focus to and away from the camera. It is fairly typical for individuals to look slightly away while thinking or talking. Thus, looking away occasionally may be appropriate, particularly if they are not looking very far away.

1	2	3	4	5
Very poor	Poor	Neither good nor poor	Somewhat good	Very good

High Rating in Non-Verbal Content

The subject's tone is warm, friendly, inviting, enthusiastic, and lively. The voice also has the proper inflection and affective expression. (Ask yourself - would you want to continue talking with this person if you had just met her?) Social reinforcers such as smiling, should be present. Gaze is good and posture is upright and oriented toward the camera.

Low Rating in Non-Verbal Content

The subject's tone is dull, somewhat depressed, or lifeless, or he/she speaks in monotone. The subject orients away from the camera (e.g., keeps looking over their shoulder or stares at the floor) and/or posture may be slumped. A lower rating should also be given for speech that is poorly articulated, pressured or labored. This would include pauses, mumbling, stammering, and repetitions. Note that true speech impediments are to be disregarded.

AFFILIATION

This integrative category rates the extent to which the participant demonstrates that he/she is motivated to be engaged and involved in the interaction with the other person.

1	2	3	4	5
Very poor	Poor	Neither good nor poor	Somewhat good	Very good

High Rating in Overall Affiliation

A high rating in affiliation is appropriate for a participant who displays friendliness and subjective feelings and attitudes of affection and warmth. The participant should show enthusiasm and demonstrate affective expression in voice. Non-verbal behaviors that depict interest should also be considered when making this rating, such as appropriate gaze and appropriate body language. The participant should display interest and reciprocity in engaging in social activities (e.g., «You say you like to go to basketball and football games. Me too!»). When rating this, think of how friendly the participant comes across, and whether you would like to interact with this person in the future. Remember that a person may display flat affect but still show affiliative behaviors.

Low Rating in Overall Affiliation

A low rating in affiliation is appropriate for a participant who comes off as cold, distant, or aloof. A person unconcerned with a need to affiliate with the confederate and manifests no behaviors that would facilitate social contact. The participant may not offer enough information. A participant who is disinterested displays behaviors that discourage continuation of the interaction, such as lack of voice inflection and saying very little. A disinterested person may appear bored or reluctant to engage in the interaction and may show little reciprocity (e.g., does not refer to anything the other participant said).

OVERALL SOCIAL SKILL

Overall social skill is a general measure of the participant's social competence and their ability to interact in an affiliative and meaningful way. It subsumes all of the other variables that are coded, including verbal and non-verbal skill. A person with good social skills is friendly, responds smoothly, and does not engage in disconcerting behavior. S/he seems to be comfortable or confident in the situation. Affective tone is appropriate. In rating this, consider how easy you think it would be to talk to the person and whether or not you would enjoy and feel comfortable talking to this person again. Rate this item last for each participant.

1	2	3	4	5
Very poor	Poor	Neither good nor poor	Somewhat good	Very good

Appendix G

FACES Coding Manual

The Facial Expression Coding System (FACES):

A Users Guide

Ann M. Kring
Vanderbilt University

Denise Sloan
Case Western Reserve University

Revision 2.0, 1992

The Facial Expression Coding System (FACES): A User's Guide

Facial expression of emotion is of great interest to many researchers. It has been studied in connection with subjective emotional experience, physiological arousal, and communication to name but a few areas. Interest in facial expression has a rich history dating back to the mid 19th century (Piderit, 1858, 1888; Gratiolet, 1865). Perhaps the most influential of these early theorists was Charles Darwin. In his book, *The Expression of the Emotions in Man and Animals*, Darwin (1896) argued that facial expressions were universal and innate characteristics. In the infancy of the science of psychology, William James hypothesized that facial expression played a causative role in the experience of emotion. In fact, according to James, changes in the facial musculature comprised a large portion of emotional state. James' ideas about emotion set forth a tradition of scholarly debate about the role of facial expression in emotion that continues today. In the early 1960's, Tomkins (1962, 1963) proposed what has become known as the facial feedback hypothesis. Stated succinctly, facial feedback theory holds that facial expression provides feedback which in turn produces the emotion. A tradition of research investigating the facial feedback hypothesis (see Adelmann & Zajonc, 1989 for a review) has ensued, but several unanswered questions remain regarding the mechanisms and functions of facial expressions of emotion.

Systems for Coding Facial Expression

Ekman and Friesen (1976, 1978) were pioneers in the development of measurement systems for facial expression. Their system, known as the Facial Action Coding System or FACS, was developed based on a discrete emotions theoretical perspective and is designed to measure specific facial muscle movements. A second system, EMFACS, is an abbreviated version of FACS that assesses only those muscle movements believed to be associated with emotional expressions. In developing these systems, Ekman importantly distinguishes between two different types of judgments: those made about behavior (measuring sign vehicles) and those that make inferences about behavior (message judgments). Ekman has argued that measuring specific facial muscle movements (referred to as action units in FACS) is a descriptive analysis of behavior, whereas measuring facial expressions such as anger or happiness is an inferential process whereby assumptions about underlying psychological states are made. It is important to point out, as Ekman does, that any observational system requires inferences about that which is being measured. Other available systems have been designed to measure either specific aspects of facial behavior (e.g., Ermiane & Gergerian, 1978; Izard, 1979; see Ekman (1982) for a selective review) or more generally defined facial expressions (e.g., Notarious & Levenson, 1979).

Why a New System?

The primary reason for developing a new system was based on the perceived need for a facial coding that is theoretically aligned with a dimensional model of emotion. Several researchers have argued that affective expression consists of two broad dimensions: valence and arousal (e.g., Russell, 1980; Schlosberg, 1952). Similarly, researchers have

argued that emotional experience variance is also best captured by two dimensions (e.g., Larsen & Diener, 1992; Watson, Clark, & Tellegen, 1988). Most currently available coding systems of facial behavior are based on discrete emotion theory and are designed to measure a number of specific or basic emotions. Although some might argue that these systems can be considered "dimensional" to the extent that discrete categories can be combined to form dimensions, this approach is inconsistent with the empirical literature upon which dimensional models of emotion have developed. The Facial Expression Coding System (FACES) was designed as a dimensional measure of facial behavior.

Second, while the Ekman and Friesen systems have been the pacesetters for studying facial expression of emotion, they are not without cost. It takes a great deal of time to train coders to use the system accurately and reliably (Ekman (1982) estimated approximately 100 hours were needed for training). Additionally, coding time can be quite extensive and as a result, often only small segments of subjects' facial behavior are coded with FACS. EMFACS is somewhat more economical in that coders are not required to detect each muscle change but rather decide if a group of changes presumed to be associated with particular emotions have occurred. Being restricted to examine small portions of a subjects data, although useful if researchers are interested in identifying specific responses to specific stimuli, can also be problematic. First, examining small segments may obscure an examination of the natural unfolding of expressive behavior over time. Second, selection of these segments most often requires *a priori* decisions about which segment is likely to produce the most expressive behavior. Selecting segments which maximize the likelihood of expressive behavior for all subjects can be quite difficult.

An Overview of FACES

The Facial Expression Coding System (FACES) was developed as a less time consuming alternative to measuring facial expression that is aligned with dimensional models of emotion. The system provides information about the frequency, intensity, valence, and duration of facial expressions. The selection of the variables included in the system was based on theory and previous empirical studies. Adopting the descriptive style of Ekman and similar to the work of Notarious and Levenson (1979), an expression is defined as any change in the face from a neutral display (i.e., no expression) to a non-neutral display and back to a neutral display. When this activity occurs, a frequency count of expressions is initiated. Next, coders rate the valence (positive or negative) and the intensity of each expression detected. Notice that this is quite different from assigning an emotion term to each expression. While FACES requires coders to decide whether an expression is positive or negative, it does not require the application of specific labels. There is support in the literature for this approach, often referred to as the cultural informants approach (Gottman & Levenson, 1985). That is, judgments about emotion, in this case whether an expression is positive or negative, are made by persons who are considered to be familiar with emotion in a particular culture. In addition to valence and intensity, coders also record the duration of the expression. Finally, a global expressiveness rating for each segment is made, and judgements about specific emotions expressed throughout the segment can also be obtained.

How to Use FACES

FACES was initially developed to measure facial expressions in response to five minute film clips. The system can be adapted to other applications, however, and attempts to represent the broad applicability of the system are made throughout the manual. Generally speaking, the system allows for the examination of a subject's entire record of expressive behavior. When we videotaped subjects viewing emotional films, the soundtrack from the movie was not included on their videotapes. Thus, coders only viewed subjects facial reactions to the films. We have typically had two raters coding each subject. As will be discussed below, reliability for FACES has routinely been very high.

Detecting an Expression

While viewing a subject's record, an expression is detected if the face changes from a neutral display to a non-neutral display and then back to a neutral display. It is important to note, however, that a facial display may not always return to the original neutral display but may instead return to a display that, although neutral, does not exactly resemble the prior neutral expression. Additionally, if after a subject displays a shift from a neutral to non-neutral display and, instead of returning to a neutral display, shows a clear change in affective expression, this change is counted as an additional expression. For example, if while smiling, a subject then raises his or her eyebrows and stops smiling, indicating more of a surprised look, two expressions will be coded.

Duration

Once an expression has been detected, the duration is measured. For convenience, a time-mark in seconds should be included on subjects' videotape. The duration measurement should start as soon as the subject changes from a neutral to non-neutral display. This time should be recorded on a coding form (sample coding forms are presented in the Appendix). The duration measurement should stop as soon as the subject changes back from a non-neutral to neutral display, and the time should be recorded on the coding form. The duration in seconds can then be calculated by subtracting the beginning time from the end time and then recorded on the coding form.

Valence

Next, the coder must decide whether the expression was positive or negative and make the appropriate notation on the coding form. If there is doubt as to whether the expression is positive or negative, a comprehensive list of affect descriptors is presented in the Appendix. Extensive research (Russell, 1980; Watson & Tellegen, 1985) has established these descriptors as either positive or negative. They are provided simply as a guide for coders in determining the valence of an expression. Coders are not asked to supply a descriptor for each expression detected.

Intensity

Intensity ratings for an individual expression range from one to four (1=low, 2=medium, 3=high, 4=very high). The low rating is given for those expressions that are mild, such as a smile where a subject slightly raises the corners of his/her mouth but does not show the teeth, and very little movement around the eyes occurs. The medium rating is given for those expressions where a subject's expression is more moderate than mild in intensity, such as a smile bordering on a laugh, with the eyebrows slightly raised and the lips apart, exposing the teeth. The high rating is given for an expression that involves most, if not all, of the face, such as laughing with an open mouth and raising the eyebrows and cheeks. The very high rating is reserved for those expressions that are very intense. An example of such an expression is one where a subject is undeniably laughing, with the mouth completely open with the eyebrows and cheeks substantially raised.

Summarizing the data

When film clips are the stimuli, we have found it useful to provide summary information at the end of each film clip. Specifically, two, subjective global ratings are taken: judgments about the specific emotion(s) being expressed and a judgment about the overall level of expressiveness. Additionally, summary information is calculated for the frequency, intensity, and duration measures for both positive and negative expressions. two sample summary sheets are found in the Appendix.

Predominant Emotion Expressed

Although not a primary focus of the system, we have used two different rating schemes to assess more specific judgements of individual emotions: a forced choice rating and Likert format ratings. Using the forced choice method to determine the predominant emotion expressed, the coder should look over the coded expressions for the entire segment to obtain an assessment of whether the subject was expressing predominantly positive or negative emotions. Then, the coder is required to choose one of seven emotions on the summary form (happiness, sadness, disgust/fear, interest, neutral/indifferent, surprise, or anger). These were chosen as manipulation checks for the emotional film clips and can certainly be modified for different applications. This can be a difficult item to code. For example, a subject who was expressive during the segment can still obtain a global rating of neutral/indifferent if the expressions were all low in intensity and short in duration.

Using Likert scales, coders are required to rate, using a six point scale (1 = not at all to 6 = very much), the degree to which each specific emotion (e.g., happiness, sadness, amusement, fear, disgust, anger, interest) was expressed during the segment.

Level of Expressiveness

This rating is the coder's global assessment of expressiveness during a segment. Before making this assessment, the coder should look at all the individual expression ratings during the segment. That is, this rating requires consideration of individual ratings of valence, duration, and intensity. The global rating of expressiveness ranges from one to five (1=low, 2=fairly low, 3=moderate, 4=fairly high, 5=high). A low rating would be given to a subject who had none or few expressions all of which were short and low in intensity. In contrast, a high rating would be assigned to a subject who had many highly intense and longer expressions.

Summary Measures

The total number of expressions is computed by simply counting the frequency of positive and negative expressions and recording these on the summary form. Similarly, the duration for expressions is computed by adding together the seconds for the positive and negative expressions (computed separately) and recording them on the summary form. Calculating mean duration is accomplished by dividing the total duration of positive expressions by the number of positive expressions. Mean negative duration is calculated by dividing the total negative duration by the number of negative expressions. Calculating the mean positive intensity requires that the positive intensity ratings be added together and divided by the number of positive expressions. In the same fashion, the mean negative intensity is calculated by dividing the sum of the negative intensity ratings by the number of negative expressions. The means for duration and intensity can be included on the summary sheet, or can be easily calculated using whatever statistical package you use (e.g., SPSS, BMDP, SAS, SYSTAT).

Things to Watch out for:

Experience with the coding system tells us that there are a number of things that can be problematic for coders if they are not discussed ahead of time. Below, we provide a list of the most common problems. This list is necessarily tied to our application and thus may not be applicable in other studies or settings. These suggestions are offered as guides, not absolute solutions, for coders.

Shifting Body Positions

A coder may sometimes mistake a change of body position for a change from a neutral to non-neutral facial display. Coders must take special care to ensure that the face changes in addition to the body posture shift in order to record that an expression has occurred.

Not paying attention

The coder should not code any expressions if the subject does not appear to be paying attention to the stimuli. Although this can be difficult to determine, if the subject is looking down or away from the stimulus that is being presented, it is likely that he or she is not attending. We have also employed separate ratings of attention in order to assess this more systematically. Depending on the application and subject population, this may be advisable.

Hand covering part of face

If a subject's hand is covering part of the face, the coder may unfortunately need to rely on the other parts of the face to detect the occurrence of facial expressions. For example, if the subject is covering the mouth area, the coder will need to pay special attention to the eye, nose, forehead, and cheek areas to code expressions.

Eye glasses

If the subject is wearing eye glasses, the coder may find it difficult to examine the subject's eyes during facial expressions. In this situation, the coder is encouraged to examine as best as possible eye movements (e.g., eyebrows raised above the eyeglass frame) as well as other areas of the face when determining whether or not an expression has occurred.

Contact lenses

If the subject is a contact lens wearer, chances are good that he or she may have eye movements related to the lenses and not to facial expressions per se. If possible, determine ahead of time if the subject wears and/or experiences any problems with contact lenses. If repetitive movements (e.g., blinking) occur that do not appear to be tied to the stimulus presentation, these should not be coded as facial expressions. Determination of this can be difficult and is best established by observing several occurrences of such movements across stimulus presentations.

Gum chewing

Subjects chewing gum can present a sticky problem for coders. Gum chewing may actually inhibit natural expressive displays. The best solution here is to make sure a subject removes gum prior to the beginning of stimulus presentation.

Talking

Talking during a study can be problematic if more than one subject is being run through a study or if an experimenter is in the room. The best advice is to strongly encourage subjects to refrain from talking during the experiment. In the event that coders

are faced with rating a segment in which a subject is talking, attempts should be made to identify an expression independent of the talking. For example, if a subject smiles and then begins talking, the smile should be recorded as an expression. If on the other hand, the subject begins talking and has clearly diverted attention from the stimulus presentation, and smiles, it should not be recorded as an expression.

Facial tics

Occasionally, a subject may repeatedly display facial movements that do not appear to be expressions of emotion and are instead facial tics. As cited above, contact lens wearers may have eye movements that are related only to the lenses. Other people may have other repetitive facial movements. These may not be obvious initially, but after viewing several minutes of a subject's record, they may become more prominent. A special case involves psychiatric patients with tardive dyskinesia. Patients who have taken neuroleptic medication for long periods of time may develop this very unfortunate side effect. Tardive dyskinesia involves uncontrollable repetitive movements that may involve facial muscles, most often those around the mouth. Any work done with psychiatric patients should involve careful assessment of these symptoms.

Assessing Rater Agreement

Since its inception, reliability for coders using FACES has been calculated using the intraclass correlation coefficient. The intraclass correlation coefficient is the correlation between one measurement (e.g., ratings of facial expressions) on a target and another measurement made on that same target (Shrout & Fleiss, 1979). More specifically, following the Case 2 study described by Shrout & Fleiss (1979), the coders (judges) are considered to be selected from a random sample of judges, and each judge rates each subject or target. That is, it is assumed that FACES can be used effectively by any set of coders. The formula used to calculate the ICC is derived from the components of a two-way ANOVA (Subjects x Coders) which partitions the within-target sum of squares into a between-coders sum of squares and a residual sum of squares. Because the variance to due coders is not ignored, the coefficient can be interpreted as an index of agreement rather than consistency (Shrout & Fleiss, 1979). As such, the formula is:

$$ICC = \frac{BMS - EMS}{BMS + (k - 1)EMS + k(CMS - EMS)/n}$$

where:

BMS = between subjects mean square
EMS = residual mean square
CMS = between coders mean square
k = number of coders
n = number of subjects

In our applications, using trained undergraduate and graduate students as coders and with varied subject populations (e.g.,undergraduates, adult community residents, psychiatric patients), the agreement has been very high, ranging from .70 to .99.

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FACES Coding Sheet

Facial Expression Coding System (FACES)

Coding Sheet

Subject ID: _____ Rater: _____ Film Type:_____

Time start: _____ Time end: _____ Duration: _____

Valence: Positive: ____ Negative: ____

Intensity: low medium high very high
1 2 3 4

Time start: _____ Time end: _____ Duration: _____

Valence: Positive: ____ Negative: ____

Intensity: low medium high very high
1 2 3 4

Time start: _____ Time end: _____ Duration: _____

Valence: Positive: ____ Negative: ____

Intensity: low medium high very high
1 2 3 4

Time start: _____ Time end: _____ Duration: _____

Valence: Positive: ____ Negative: ____

Intensity: low medium high very high
1 2 3 4

FACES Summary Sheet

What is the overall level of expressiveness for this person for this film clip?

Low	fairly low	medium	fairly high	high
1	2	3	4	5

Number of positive expressions: _____

Number of negative expressions: _____

Mean intensity-positive: _____

Mean intensity-negative: _____

Duration of positive expressions: _____ (in seconds)

Duration of negative expressions: _____ (in seconds)

Appendix H

Positive and Negative Affect Schedule

PANAS:

Read each item and mark the appropriate answer in the space next to that word. Please rate <u>how you felt during the social interaction</u> you just completed with the other participant.

1 very slightly or not at all	2 a little	3 moderately	4 quite a bit	5 extremely

1. interested	_____	2. irritable	_____
3. distressed	_____	4. attentive	_____
5. excited	_____	6. alert	_____
7. upset	_____	8. ashamed	_____
9. strong	_____	10. afraid	_____
11. guilty	_____	12. inspired	_____
13. scared	_____	14. nervous	_____
15. hostile	_____	16. determined	_____
17. enthusiastic	_____	18. jittery	_____
19. proud	_____	20. active	_____
21. sociable	_____	22. lonely	_____
23. rejected	_____	24. friendly	_____

Appendix I

Willingness to Interact Scale

Please rate how willing you would be to have further interaction with your partner. "Partner" in the questions below refer to the person you just introduced yourself to.

1. How willing would you be to go to a movie with your partner?				
1	2	3	4	5
definitely willing	somewhat willing	neutral	somewhat unwilling	definitely unwilling
2. How willing would you be to ask your partner for advice?				
1	2	3	4	5
definitely willing	somewhat willing	neutral	somewhat unwilling	definitely unwilling
3. How willing would you be to go on a 3 hour bus trip with your partner?				
1	2	3	4	5
definitely willing	somewhat willing	neutral	somewhat unwilling	definitely unwilling
4. How willing would you be to invite your partner to your home?				
1	2	3	4	5
definitely willing	somewhat willing	neutral	somewhat unwilling	definitely unwilling
5. How willing would you be to invite your partner to a social event?				
1	2	3	4	5
definitely willing	somewhat willing	neutral	somewhat unwilling	definitely unwilling
6. How willing would you be to admit your partner into your circle of friends?				
1	2	3	4	5
definitely willing	somewhat willing	neutral	somewhat unwilling	definitely unwilling

Appendix J

Positive Reactions to Partner

Please rate how strongly you agree with the following statements about the social interaction. "Partner" in the questions below refer to the person you just introduced yourself to.

1. I liked talking to my partner.				
1 completely agree	2 agree somewhat	3 neutral	4 disagree somewhat	5 completely disagree
2. I would like to talk with my partner again in the future.				
1 completely agree	2 agree somewhat	3 neutral	4 disagree somewhat	5 completely disagree
3. I trust my partner.				
1 completely agree	2 agree somewhat	3 neutral	4 disagree somewhat	5 completely disagree
4. My partner seemed like a warm, caring person.				
1 completely agree	2 agree somewhat	3 neutral	4 disagree somewhat	5 completely disagree
5. I would rather spend time alone than spend more time with my partner.				
1 completely agree	2 agree somewhat	3 neutral	4 disagree somewhat	5 completely disagree
6. I enjoyed our conversation.				
1 completely agree	2 agree somewhat	3 neutral	4 disagree somewhat	5 completely disagree
7. It was interesting to get to know my partner.				
1 completely agree	2 agree somewhat	3 neutral	4 disagree somewhat	5 completely disagree
8. I am concerned about what my partner thinks of me.				
1 completely agree	2 agree somewhat	3 neutral	4 disagree somewhat	5 completely disagree

Appendix K

Post-Experimental Inquiry

You have now completed all the questionnaires and assessments, and we'd like to thank you again for participating in our study about how people get to know one another.

What did you think of the study?

Did you think there was more to this study than we told you about?

If no, please refer to debriefing script.
If yes, prompt further to determine what participant was suspicious about. Then refer to debriefing script.

_____ Participant was **not** aware of deception. [CODE 1]

_____ Participant was **fully** aware of deception. [CODE 2]

_____ Participant was somewhat aware of deception and/or was suspicious but could not come up with anything specific.

Appendix L

Email/Phone Script for Recruitment from Mass Screening

Hi, my name is _____ from the Department of Psychology at the University of Maryland.

Based on your responses from the [mass] screening questionnaire[s], we are inviting you to participate in our research study examining how people get to know one another when they first meet. You will also be asked to complete questionnaires about your social interactions with others and experiences you may have had in the past. This study will last approximately two to two and a half hours.

If you participate in this study, you can choose to receive a monetary payment of _____ or course credit. Full disclosure will be provided upon the first meeting. Agreeing to come in does not obligate you to participate.

If you are interested in participating please email or call us back at _____ .

Appendix M
Debriefing Script

Thank you for your participation in this study on how people get to know one another. During this research study, you were asked to introduce yourself to a participant in another room via closed-circuit television. The purpose of this research is to explore the verbal and nonverbal behaviors associated with social interactions. It is expected that individuals who are more social will display more warmth and affiliation when interacting with others.

You were led to believe that you were interacting with another participant in the next room; however, in reality, the person you saw on television was an actor whose clip was scripted and pre-taped. This deception was necessary because we wanted participants in the study to behave as naturally as possible. If we had told you that the person was an actor, it might have affected what you said and how you behaved. We wanted to use an actor so that everyone in the study would be responding to the same person.

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